THE INTERNATIONAL JOURNAL OF
Clinical and Experimental HYPNOSIS

VOLUME VII | *July, 1959* | NUMBER 3

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Published Quarterly by
THE SOCIETY FOR CLINICAL AND EXPERIMENTAL HYPNOSIS
at Mount Royal & Guilford Aves., Baltimore 2, Md.
PRINTED AT THE WAVERLY PRESS, INC.

Subscription Rate: $8.00 per year; $2.50 per single issue. Write DR. MILTON V. KLINE, *Editor*, 345 W. 58th St., New York 19, N. Y.
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EDITORIAL

The continuing rapid expansion of hypnosis as a therapeutic procedure in the medical and psychological sciences as well as continuing research which falls into virtually every area of behavioral investigation is at the present time, to paraphrase William James, running through the same characteristics that he described in connection with "the classic stages of a theory's career". As with a new theory which James described as "first being attacked as absurd, then admitted to be true but obviously insignificant and, finally, becoming so important that its adversaries claim that they themselves discovered it," we now find that in many quarters, some respected, and some not so respected, new authorities speak for scientific hypnosis where in the past their voices have either been nonexistent or in loud opposition.

New adherents to either theoretical or operational concepts are not necessarily always to be applauded unless we fully understand the motivation for the change. During the past fifteen years there have been an increasing number of serious and dedicated workers both in the clinical and experimental fields who have been responsible for removing hypnosis from the shadows of an archaic psychology of suggestion and integrating it with prevailing and meaningful concepts of psychodynamics, psychophysiology and an understanding of the nature of human behavior as it relates both to developmental and pathological aspects.

The Society for Clinical and Experimental Hypnosis in its more than eleven years of existence has set as its goals not only the stimulation of research and the advancement of clinical practice, but the development of sound standards of competence and a critical understanding of the nature of hypnosis so as to lead eventually to the development of effective and expanding programs of education in this field. Many members of the Society have been responsible for advancing educational programs and developing a frame of reference which would neither relegate hypnosis to a therapeutic orientation by itself, nor supress the potentialities that it might have in an expanding concept of psychodynamics and psychotherapy as these elements play a role in all areas of clinical application.

During the past number of years, formal training programs in hypnosis have been solidly established at the University of California at Los Angeles, the University of Texas, Southwestern Medical School, Long Island University and more recently, the Seton Hall College of Medicine. Other courses have also been initiated; designed to present a well developed concept of hypnosis in relation to its applications in medicine, psychology and dentistry. The need for continuing examination

of what constitutes adequate education in this field is at the present time a prime prerequisite, and the Society for Clinical and Experimental Hypnosis, through the *Institute for Research in Hypnosis* has planned a series of conferences, the first of which was held at the New York Academy of Sciences on May 23rd 1959. This conference was designed to initiate a serious evaluation of what constitutes adequate training in hypnosis. Through cross discussion and communication with those workers in the field who have been most responsible for the development of training programs, and who themselves feel the need for the development of a better standardized curricula, may emerge also a clear cut understanding of the various orientations and roles that hypnosis may play in the fields of medicine and psychology. We shall look forward to the results of these conferences, since to a great extent, further development of the specialized use of hypnosis will be dependent upon more expansive and more adequate training, and to make that training available is one of the prime considerations of the Society and the Institute.

It is not unlikely that those who conceive of hypnosis as a dynamic and productive aspect of human behavior and not as a static, mechanical modality for producing relaxation and sedation, will be faced with polemical opposition, perhaps couched in the phrases of authoritative pronouncements. It is the responsibility of serious workers in this field to be critical of whatever pronouncements may be made in connection with hypnosis when they may originate from sources which, while vocal and aggressive in nature, may be sadly lacking in scientific and experiential endowment. The course and direction of further work in the area of scientific hypnosis, both in relation to its clinical and experimental foundations and educational evolution, must be determined by the experiences and the planned objectives of skilled workers in this field and should at no time be subject to arbitrary pronouncements which perhaps while bearing the mark of group organization, bears little resemblance to recommendations from carefully planned observation and evaluation.

We have indeed reached the third stage of a theory's career as described by William James and must, for this reason, assume an attitude of more critical vigilance with respect to all developments in the field of hypnosis.

The establishment of The American Board of Clinical Hypnosis with its three divisions: The American Board of Medical Hypnosis, The American Board of Examiners in Psychological Hypnosis and The American Board of Dental Hypnosis, represented the determination of the Society to put into effect a means for establishing standards of competence and for differentiating between the trained and the untrained

worker in this field. In no respect does the establishment of these Boards single out hypnosis as a specialty unto itself, but rather as a specialized field which has both valuable and meaningful applications in all of the specialties of medicine, psychology and dentistry. There have been deliberate attempts to distort the purpose and the meaning behind the establishment of these Boards, the reasons being both polemical and destructive. In connection with these issues, the *Journal* wishes to publish two letters written by Dr. Jerome M. Schneck, President of The American Board of Medical Hypnosis, since to a great extent they articulately clarify the confusion which a few have wished deliberately to create. Honest differences of opinion are always to be welcomed. Insidious and destructive motives to undermine and obliterate must not only be detected but exposed. While it is never a very pleasant task to have to do this, it is nevertheless the responsibility of the mature professional society and its organ of communication to have to face these issues realistically.

Milton V. Kline

AMERICAN BOARD OF MEDICAL HYPNOSIS

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MONTREAL 6, QUE., CANADA

March 25, 1959

Leo H. Bartemeier, M. D., Chairman
Council on Mental Health
American Medical Association
6420 Reisterstown Road
Baltimore 15, Maryland

Dear Dr. Bartemeier:

The March 21, 1959 issue of the *Journal of the A.M.A.* contains an announcement of a newly formed Committee on the Medical Use of Hypnosis under the Council on Mental Health. The announcement contains allegations about the American Board of Medical Hypnosis which are untrue. The basic facts pertaining to our Board are contained in a Statement of Policy issued toward the close of 1958. This Statement of Policy is in the possession of Dr. Louis West who is a member of the Committee on the Medical Use of Hypnosis and who happens also to be a Diplomate of the American Board of Medical Hypnosis. In addition, this Statement of Policy is in the possession of Dr. Edward L. Turner, along with other pertinent correspondence in his former capacity as Secretary of the Council on Medical Education and Hospitals.

The same is true of Dr. Louis A. Buie who had been contacted in his position as Secretary of the Advisory Board for Medical Specialties. I had regarded both Dr. Turner and Dr. Buie as helpful in the information they supplied regarding steps we might take in an effort to obtain eventual A.M.A. approval for our Board. Were you to check on the Statement of Policy and on the above-mentioned correspondence, I feel certain that you would be impressed by the tone and intent contained therein, in contrast with the astonishing claims of a vocal and emotional opposition.

A central issue appears to be an earlier announcement in the *Journal of the A.M.A.* about our Board. I should like you to know that Dr. Turner corresponded with me about this announcement and I agreed to his wish for a statement to be incorporated within it, mentioning that the A.M.A. had not given its approval to this Board. I was surprised to find when the announcement appeared that this additional statement had not been added, and that the only change was a minor one giving a mailing address for our Secretary different from the address originally submitted. Surely we carry no responsibility in this matter. Subsequent announcement by the A.M.A. of non-approval can only be take by readers as implying disapproval.

You must realize that the doubt cast on our Board will spread (see *The A.M.A. News*, March 23). Unfortunately the damage that has been done cannot be rectified. The sincerity and good intentions of the Board as reflected in our Statement of Policy and correspondence with the A.M.A. should be evident to anyone who takes the trouble to review it. Frankly, I am puzzled as to the reason for responsible people in the A.M.A accepting the assertions of an opposition instead of resorting to the very simple expedient of requesting the basic facts from us.

Regardless of what has transpired I believe you should have the information contained in this letter in order to assist you in arriving at your own conclusions. Truthfully, I find this type of controversy personally offensive and professionally immature. Undoubtedly you too are not especially pleased to have to concern yourself with these issues.

Sincerely yours,

Jerome M. Schneck, M.D.

JMS/s
cc: Dr. Edward L. Turner
Dr. Louis A. Buie
Dr. Walter S. Wiggins

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March 26, 1959

Johnson F. Hammond, M.D., Editor
The Journal of the American Medical Association
535 North Dearborn Street
Chicago, Illinois

Dear Dr. Hammond:

In a letter to the Editor which appeared on February 14, 1959, page 746, about the American Board of Medical Hypnosis, there are issues of fact and implication which require correction and clarification in fairness to your readers. It was stated that this Board is "organized by private individuals". The American Board of Medical Hypnosis is a division of the American Board of Clinical Hypnosis. The latter has divisions also in psychology and dentistry. The American Board of Clinical Hypnosis is incorporated in the State of New York. Furthermore, the American Board of Medical Hypnosis is sponsored by The Society For Clinical And Experimental Hypnosis, the representative scientific organization in this field since 1949. The Board is affiliated with an educational unit, The Institute For Research In Hypnosis, also incorporated in the State of New York. Your readers would be interested in knowing that leading members of the sponsoring association, The Society For Clinical And Experimental Hypnosis, served individually as special consultants to the Council On Mental Health in connection with the 1958 Report on Medical Use of Hypnosis.

The aforementioned letter questions the medical hypnosis Board on the ground that hypnosis is "not a specialty", apparently implying that this Board attempts to establish it as such. The fact is that our Statement of Policy specifically reads, "The purpose of the Board is to certify trained or experienced physicians in medical hypnosis with consideration for their basic training in the several medical specialties and areas of practice of which medical hypnosis shall constitute one aspect." The American Board of Medical Hypnosis opposes any limitation of practice to the use of hypnotic methods alone.

The writer of the opposition letter claims that his group "wishes to abide completely by the regulations established by the Council on Medical Education and Hospitals of the American Medical Association." This may give the impression that the same is not true of the

American Board of Medical Hypnosis. It should be known, therefore, that at its very inception this Board established contact with Dr. Edward L. Turner of the Council on Medical Education and Hospitals, and with Dr. Louis Buie of the Advisory Board for Medical Specialties. Their cooperation was enlisted for advice and guidance in the hope that the Board would eventually qualify for functioning under A.M.A. auspices.

It is not known as yet whether the American Board of Medical Hypnosis will be in a position to function within specifications developed by the American Medical Association and related organizations. As an indication of the standards established, however, it should be pointed out that one of the requirements for recognition by the American Board of Medical Hypnosis is prior certification by one of the American Medical Specialty Boards approved by the Council on Medical Education and Hospitals and the Advisory Board for Medical Specialties, or active membership in the American Academy of General Practice. Should it develop that the structure of the hypnosis Board be too atypical for operation among the basic specialty boards, it may still be hoped that the American Medical Association will accept the Board's special status, and cooperate actively in its functioning as an indication of interest and resolve to support high level education and practice in this area.

Sincerely yours,

Jerome M. Schneck, M.D., President
American Board of Medical Hypnosis

JMS/s
cc: Dr. Edward L. Turner
Dr. Louis A. Buie
Dr. Leo Bartemeier
Dr. Walter S. Wiggins

BRAIN FUNCTION IN HYPNOSIS

MAGDA B. ARNOLD

In recent years, there has been renewed interest in the scientific study of hypnosis and a renewed attempt at explanation. Quite recently, in a series of brilliant articles, Barber has surveyed the available experimental evidence and investigated crucial points in experiments of his own. He concludes that the term "hypnosis" indicates a transaction between the hypnotist and the hypnotized subject in which the hypnotized person comes to believe that the hypnotizer has the power to make him experience and do what the hypnotizer says and thus he excludes everything else from his attention, accepts the hypnotizer's statements as literally true and is willing to do what he is told.

Granted that Barber is right, the puzzle remains just how the hypnotizer induces such an attitude in his subject. What is happening to alter the subject's psychological processes in this particular way? Normally, a man remains open to other impressions and does not accept a suggestion uncritically, even from a prestige person. In spite of Barber's insistence that hypnosis is not a separate state, there must be some change in the usual functioning of a person which is responsible for this sharply altered behavior. To say that this altered behavior *is* the hypnosis, is *all there is to it*, leaves the question unanswered just how this alteration is brought about.

According to Barber, "the subject behaves in 'unusual' ways only when the interacting and overlapping processes between the subject and the hypnotist are effective in altering the subject's perceptions and interpretations of himself and his surroundings." Again we ask: How and why does this interaction alter the subject's perceptions and interpretations? Simply to say that it does is not to explain the process.

Perhaps we will be able to approach an explanation by looking at some of the findings. Young (1928), for example, found that the best hypnotic subjects were capable of deep abstraction or of reveries amounting almost to ecstasy; or they could put themselves to sleep—all this before they had ever been hypnotized. Apparently, they were able at will to exclude everything inessential and concentrate on one thing. Barber also pointed out that the same detachment from the environment occurs in sleep, where muscles relax, thought ceases and attention to stimuli is at first reduced and finally excluded. But there is this difference, that the hypnotized person is more than usually attentive to one set of stimuli, the statements of the hypnotizer. In sleep, the attention to all stimuli is uniformly reduced.

Barber's objection to calling either sleep or hypnosis a "state of consciousness" seems to be based on the notion that such a state would have to be superimposed upon the various ongoing processes: the decrease in attention and thought, the increasing muscular relaxation. He insists that these changes in organismic processes *are* sleep or hypnosis. But surely the *experience* that attention becomes difficult, that that thought merges into dream, that muscles will not move, is a state of consciousness. The psychological experience to which we refer when we speak of a "state" is not superimposed upon organic processes: it is the *experience* of these processes.

According to J. A. Gasson (1954),

> "what is conscious must indicate some psychological experience, something lived through of which we know; a knowing or wanting or a doing or a happening in us of which we have direct knowledge and which we refer to ourselves. Such psychological experience, moreover, in itself or in its content, must be fully available to us here and now for the needs of the present moment." (1954, p. 209.)

We are awake and fully conscious when we are aware of what goes on around us, when we can shift our attention at will from one thing to another, when we are ready to move or talk as soon as it seems expedient, when we remember our experience and reflect upon it. When asleep, we can do none of these things. The imagery we call dreams is not something we start to do, it is something that happens to us during sleep. When hypnotized, we are conscious of what goes on around us, but only as far as the hypnotizer permits. Hence we can shift our attention only at his behest, we move or talk when he tells us to do so, we remember our experience and reflect upon it only when he asks us to do so, or when his instructions presume that we do. When we are awake and concentrating on something, we do not *want* to shift our attention to anything else. We do not want to move or talk; we remember only what is relevant to the object upon which we are concentrating and reflect only on it. These differences seem to be sufficiently important to prevent us from confusing hypnosis with either sleep or deep concentration, though hypnosis is similar to sleep in that it usually begins with muscular relaxation and is accompanied by lack of spontaneous thinking, planning or talking. It is similar to deep concentration in that it excludes from attention everything that is irrelevant.

Given these differences in experience, there must be a difference in the organic processes that bring it about. And this means that there should be identifiable differences in brain function. Now we know that there are such differences in the EEG taken during sleep and that taken during waking. During deep sleep, the EEG shows large slow waves,

during light sleep or drowsiness alpha spindles, during relaxed resting it shows regular trains of alpha waves and finally during mental work or sensory stimulation alpha waves disappear and is replaced by fast low amplitude electrical activity. When the hypnotized person is listening to the hypnotizer or carrying out his commands, he has a waking EEG but when he is left to himself this is replaced by an EEG indistinguishable from that during deep sleep (cf. Kline, 1958).

Conditions of consciousness. Now let us see whether we can specify the conditions necessary for full waking consciousness, in the hope that we will be able to identify the brain functions which mediate it. If we do, we might be able to discover the processes responsible for the altered conditions in sleep and hypnosis.

Even if a man is not able to move or talk, he may be fully aware of what goes on around him. On the other hand, he may move and even speak, yet not be able to reflect on what he is doing, nor to understand or explain his actions and remember them afterwards (e.g. in epileptic automatisms). In such cases, there is a falling short of full consciousness. But to be conscious even in this imperfect way, a man must be able to perceive and appraise at least some things. And to be fully conscious, he must be aware of the external world and of himself acting in it, must be able to reflect and remember and to use for action what he so knows.

Neurologically, the functioning of some afferent sensory pathways is necessary for full consciousness, but the functioning of the sensory system is not sufficient. Sensory impressions may be received (as shown by sensory potentials recorded from the sensory cortex), yet a man may be unconscious (for instance in deep sleep or in anesthesia). To become aware of what our senses receive seems to require something beyond mere sensory afferent activity. It requires the excitation of pathways in the brain which are not included in the sensory system but also do not belong to the motor system: a man may be fully conscious and able to direct his attention to everything that goes on around him, even though he is completely paralyzed. Awareness must be connected with the functioning of a system that lies between sensory and motor system and links afferent and efferent tracts. Moreover, this system cannot lie within the cortex because cortical injuries neither interfere with consciousness nor do they change the overall EEG, while injuries to the brain stem may produce coma and slow EEG rhythms.

The action circuit. It is possible to identify this system if the neurophysiological research findings of the last few years are carefully reviewed and correlated. The results of such an attempt at integrating psychological experience with neurophysiological research will be published in detail in a forthcoming book. Here I will try to sketch briefly

the sequence from perception to appraisal, emotion and action, as I have tried to work it out on the basis of such evidence.

We experience objects located in space when neural impulses from the receptor organs arrive in the cortical sensory areas; but this experience is as yet devoid of meaning. However, the bare sensations are experienced and can even be appraised as pleasant or unpleasant, according as they are either within the optimal range of intensity or beyond it. This appraisal seems to occur when neural impulses from the sensory pathways arrive in the cortex of the limbic lobe.

Next we must *identify* what we see or hear by remembering similar things and the effect they have had on us. This seems to occur when neural impulses are relayed from the limbic areas via the hippocampus to the brain stem and from there to sensory and motor association areas.

Once we know what this thing is and what to expect from it, we can decide on appropriate action. An impulse to action seems to be set off when neural relays from cortical sensory and association areas are collected in the hippocampus and sent on to the brain stem and cerebellum. In the cerebellum the neural impulse seems to be transformed into a coordinated motor pattern consisting of fast frequency relays which are relayed back to the brain stem; from there, one relay seems to travel via the hypothalamus to the premotor cortex, mediating the experience of an emotional action tendency, an impulse to flee, fight, eat, mate, etc. Another relay via the ventral thalamic nuclei finally activates the motor cortex and leads to actual movements. The so-called "brain stem activating system" seems to form part of this chain of relays which we have called the "action circuit." Hence stimulation of the brain stem activating system induces motor activity and can wake the animal from sleep; it also produces fast frequency waves in the EEG, the so-called "arousal reaction" typical for the waking state.

An impulse to rest and relax seems to be mediated by a relay from hippocampus to cerebellum and brain stem which is transformed there into low frequency patterns which hyperpolarize the motor neurons (making them temporarily inexcitable) when this relay arrives in the motor cortex (cf. Eccles, 1953). Gradually, muscular relaxation spreads until movement is completely suppressed (e.g. in deep sleep). At the same time, fast waking activity in the EEG is replaced by the slow waves of deep sleep.

Brain function during sleep. Sleep is more than merely an absence of motor activity. Sensory reception is reduced or inhibited, even though sensory potentials can be recorded from cortical receiving areas during sleep as well or better than during waking. During sleep, sensory impulses are received but they do not always wake the sleeper.

Even strong stimuli will have no effect during the first deep sleep after long vigil. Vegetative functions also are reduced: respiration is slowed, there is a slight fall in temperature and blood pressure, and liver function is reduced. The basal metabolic rate goes down and various reflexes are depressed or abolished (Akert, 1950; Peele, 1954).

Such a state of reduced functioning seems to imply generalized inhibition. Though some muscles are always inhibited during coordinated action, in sleep there is a relaxation of agonists and antagonists alike. Also, there seems to be a generalized inhibition or depression of sensory experience and perhaps even of sensory reception. Hence it would seem that there must be a system which can mediate such general inhibition. This system would have to be connected with the action system described above, for deliberate muscular relaxation is known to lead to a lowered sensitivity to stimulation and eventually to sleep (cf. Jacobson, 1932).

There is a system that has such widespread connections and could lead to general cortical inhibition, the so-called "diffuse thalamic system." When it is stimulated with slow frequency current, the activity of the brain is apparently depressed to the point where alpha waves of the relaxed resting state give way to alpha spindles seen in drowsiness, and finally to the slow waves of deep sleep. This system includes the medial center nucleus (centrum medianum), the reticular and other intralaminar thalamic nuclei, and the thalamic nuclei of the midline. It receives relays from the caudate nucleus, the cerebellum and other subcortical regions and projects diffusely to all areas of the cortex via the reticular thalamic nucleus (cf. Jasper, 1954, Hanberry et al., 1954). Each thalamic reticular nucleus straddles the fibers of the internal capsule like a cresent comb. Its fibers end in the superficial layers of the cortex where they can affect the dendrites of the pyramidal cells in the deeper layers. Hence the diffuse thalamic system apparently receives relays from the action circuit and controls the total cortical surface.

When this system is stimulated by a slow frequency current, there is (after some delay) a train of 8–10 c.p.s. spindles in the EEG, which has been called the "recruiting response" by Forbes and others (cf. Brazier, 1954). It seems to occur when more and more neurons are recruited by the stimulating current and begin to conduct at the same frequency. The recruiting response cannot be induced in the waking animal; apparently, waking activity seems to counteract it just as it counteracts the alpha spindles of drowsiness. At the same time, the recruiting response occurs in the anesthetized animal only when the diffuse thalamic system is stimulated (directly or indirectly). Since the

recruiting response seems to indicate a more active state than anesthesia and the rhythm resembles the alpha spindles of drowsiness, it could well accompany such a state between sleeping and waking.

Shimamoto and Verzeano (1954) showed that the recruiting response depends on the nuclei of the diffuse thalamic system. Its latency is long enough to allow for a relay via the action circuit. Slow frequency (or low intensity) stimulation of the diffuse thalamic system induces sleep in the waking cat, while higher frequency or intensity arouses the animal from sleep (Hess, 1954). This has been confirmed for the rat (Caspers and Winkel, 1954). Hence this system seems to facilitate cortical activity when excited by fast frequency relays, and to reduce it when excited by slow frequency stimulation.

It would seem that it must be the diffuse thalamic system which induces sleep when its rhythm slows below the alpha frequency. Through its projection to the cortex, it seems to inhibit the motor cortex and the sensory and association areas. As more and more neurons are included in the "recruiting response," movement will become slower, attention will flag, sensory impressions will be experienced dimly if at all, and a state of drowsiness will eventually merge into sleep.

According to Hess and Akert (1954), the depression of function during sleep is never strictly simultaneous, nor does it happen in an unchanging sequence. Apparently, sleep may affect one or the other system (motor or sensory) earlier than others. Hess (in Akert, 1954) mentions the difference, for instance between a cat that is asleep in a comfortable position yet opens its eyes at the slightest sound, and a cat that is asleep sitting up with its head hanging down, yet does not wake up even when there is considerable noise.

Brain function in hypnosis. Such a differential reduction of activity seems to occur in hypnosis also. The muscular relaxation that is usual during induction of hypnosis makes it possible to exclude afferent impulses from muscles. While muscular relaxation may be achieved by a deliberate decision "not to do anything" (cf. Jacobson, 1932), the hypnotizer usually induces it in his subjects by telling them that they will feel completely relaxed, drowsy, unwilling to move. (The subjects vividly imagine this state of affairs, which results in carrying out what they imagine because all other activity is inhibited.*) The gradual muscular relaxation is brought about via the action circuit and eventually results in inhibition or depression of sensory experience also, for the action circuit is connected with the diffuse thalamic system. When

* It has been shown that imagining a sensation can result in experiencing this sensation, and imagining a movement results in making it, if contradictory action impulses are excluded (cf. Arnold, 1946).

the hypnotizer next instructs the person that "he cannot pull his hands apart" or that "his arm is becoming stiff," the subject again imagines and feels happening what is described to him and so brings it about. This partial muscular innervation promotes a dissociation of activity from inhibition which typically deepens the hypnotic state.

It would seem that the first decision to cooperate with the hypnotizer by listening and letting himself imagine and feel what the hypnotizer describes, leads the subject to concentrate on this activity to the exclusion of all other action impulses. This decision to cooperate may sometimes be forced, for instance when the hypnotizer impresses his subjects as a man of unquestioned power. Whether a man cooperates willingly or is impressed against his wish, once he starts out thinking along with the hypnotizer, he gives up every attempt to think or do anything on his own. If this inhibition of irrelevant action impulses is complete, he will literally neither act nor think except as the hypnotizer commands or implicitly permits. Hence the characteristic absence of humor in the hypnotized subject, his extraordinary singlemindedness, his report, when asked, that he is not thinking of anything (cf. Barber, 1958). The "poor" hypnotic subjects are those that keep evaluating what the hypnotist says, or commenting to themselves, or finding the situation ridiculous. Basically, they have not excluded irrelevant action impulses, rather, they continually indulge in them. Hence the necessary concentration on the hypnotist, the muscular relaxation and consequent depression of sensory experience never occur.

When the subject is completely concentrated on what the hypnotizer is saying, when he has achieved such intensification of his imagination that it carries him into action, he not only does what he is told to do but sees, hears and feels what he is supposed to. Hypnosis has been used to abolish the pain of the last stage of cancer, amputation, fatal burns, Caesarian section, childbirth and hysterectomy (cf. Barber, 1958). This insensitivity to pain can be easily explained if, as we think, pain is a reaction to somatosensory experience rather than a sensation, probably mediated by the limbic cortex of the posterior cingulate gyrus and posterior insula (cf. Arnold, Ch. 14). Since the diffuse thalamic system projects to these regions, analgesia can be explained as a depression of the somatosensory limbic cortex which results in appraising the organic sensation as indifferent rather than painful (i.e. as falling within the optimal range of sensitivity).

It is well known that the activity of cortical receptor areas can be either reduced or intensified by stimulating areas in the brain that are connected with the diffuse system (cf. Jasper, 1954). Hence hypnosis can reduce the intensity of sensory impulses but it can also exaggerate

it. In fact, it can even reorganize the perceptual pattern. Thus Barber has found that hypnotized subjects could see a non-existent color and experience the correct after image, even though they knew nothing about after images. This can happen because sensory experience, as suggested above, is an activity that goes beyond the mere registration of sensory impulses. It includes the activation of memory images necessary to identify a color or an object. Hence activation of the visual image of that color on the basis of the hypnotic suggestion resulted in activating the same visual area that would be activated when the color is actually seen. This is possible because the visual receiving areas and the visual association areas have two-way connections.

Similarly, when the hypnotized person is told that Mr. A, who is in the room, is actually Mr. B, he will not only believe this to be so, he will actually see Mr. B and not Mr. A. Again, he visualizes what is described to him. Since all interfering thoughts and actions are excluded, this visualization is so vivid that it is superimposed upon what is actually seen and becomes a hallucination fitting into the perceptual field. The connection of the action circuit (which mediates recall of the memory image) with the diffuse thalamic system allows the inhibition of "irrelevant" impulses from the visual area and thus prevents a correction of the hallucinated figure by the visual impression. The hypnotized person believes that the hallucinated object really exists because he has made himself incapable of evaluation or criticism by excluding all irrelevant action impulses from the beginning. As long as his single-minded concentration lasts, he is incapable of seeing any incongruity either in his actions or his perceptions.

Of course, such concentration is not necessarily complete as soon as a man is hypnotized. In fact, throughout a session the hypnotizer implicitly allows many activities as, for instance, the free functioning of sensory awareness and memory. For this reason, any suggestion that the subject cannot see or hear or feel requires a careful description of the situation and usually takes some time, even for a good hypnotic subject. If the hypnotizer takes the trouble to prescribe in detail what his subject is to sense, feel and do, and arranges for consistent experience, the subject will eventually exclude all activity that is not expressly permitted. Barber, for instance, has shown that hypnotized subjects will walk around a chair or avert their eyes from it but will not bump into it, if they are merely told that the chair is not there. But when the hypnotizer makes his statement credible by picking up the chair and taking it out of the room while their eyes are closed and then quietly bringing it back, they will give every evidence of being unable to see the chair. They will look through it and walk into it

with eyes open. The hypnotizer apparently must manipulate the situation in such a way that the subjects do not receive any sense impression contrary to his statement. This could be done also by telling the blindfolded subjects that they will not see the chair, nor will they *hear* anything except the hypnotizer's voice. The chair will be taken away but they will not hear it. If that is done they should have no difficulty: they should not see the chair even though it has not been taken away.

Similarly, it is not enough to tell hypnotized subjects that they are color blind or deaf, unless they are made to realize the extent of this defect. To tell a person, for instance, that he does not see red and green does not necessarily imply to him that pink, lavender, lime etc. will be changed also. But if he is told that he does not see green of whatever hue, neither does he see red of whatever hue, he will inhibit the total green or red spectrum and perform on the Ishihara test like a color blind person. This does not mean that he is faking, i.e., inhibiting these sensations deliberately. As far as we know this cannot be done. He can do it under hypnosis because he can concentrate exclusively and singlemindedly on a world without any hues of green or red.

Summing up, it would seem that whenever a person decides to cooperate with the hypnotist (whether this cooperation is voluntary or forced by the hypnotist's prestige) there is an inhibition of every other action impulse except the impulse to act as the hypnotizer wants him to act. The induced muscular relaxation incidentally reduces sensory stimulation; hence the person becomes unconcerned about everything except the hypnotist's statements and instructions. He acts as the hypnotizer wants him to act because he is incapable of evaluating or criticizing his statements and is forced to accept them as literally true. Whenever the inhibition of rival action impulses is not complete or the hypnotist does not describe the situation in a literal and unambiguous way, the subject will not become deeply hypnotized or will show inconsistency in the actions suggested to him.

Neurologically speaking, the exclusion of irrelevant action impulses depends on a set to imagine what the hypnotizer is describing; this set to imagine is mediated by the hippocampal action circuit (described in detail in a forthcoming book) which is connected with the diffuse thalamic system. The latter mediates the reduction or intensification of neural conduction from sensory areas to limbic cortex and hippocampus, and thus is instrumental in the *exclusion* of sensory impressions, resulting in *lack* of pain or of sensory experience or, conversely, in the *production* of pain and sensory hallucinations. Suggested action states (e.g. cataplexy) are mediated via the action circuit connecting with the premotor and motor cortex, and represent motor

imagination transformed into action. Suggested sensations are mediated via the action circuit connecting with the association and sensory receiving areas, and represent projected memory images which are accepted as real because the impulse to appraise and evaluate has been excluded. Suggested goal-directed actions flow from the suggested situation and are mediated via the action circuit just like any action carried out without hypnosis.

Our hypothesis offers a psychological as well as a connected neurological explanation which is detailed enough for experimental investigation. In addition, it includes and explains some recent concepts: Hypnosis does imply a "restructuring of perception" (Barber), in which the hypnotized person is "striving to behave like a hypnotized subject" (White); hence he is "playing a role" (Sarbin). Likewise, Braid's "monoïdeism" finds its explanation.

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BODY-SWAY SUGGESTIBILITY IN PARANOID AND NONPARANOID SCHIZOPHRENICS[1]

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The present paper investigates two problems: (a) the extent of static ataxia and body-sway suggestibility in paranoid and nonparanoid schizophrenics and (b) the relationship between body-sway suggestibility and measures of verbal conditioning.

About the first problem, not much is known concerning the differential reaction of paranoid and nonparanoid schizophrenics to the body-sway suggestibility test. Although in a recent study there was some evidence that psychotics, as a group sway more backwards as compared to normals (6), no information was available as to the individual reactions of the two main groups of psychotics manic depressives and schizophrenics. In a much older study, Williams (9) counted the number of forward and backward sways of catatonics, paranoids and manic depressives. Allowing for the inaccuracy involved in such a procedure of counting the number of movements, his conclusions were clear cut: catatonics had the highest number of backward sways, paranoids the lowest and Manic Depressive Psychotics in between. The opposite held good for the number of forward sways. Later, Bartlett (1) confirmed at least one part of the results obtained by Williams, that paranoids do not sway more backward than forward. The greater backward sway in the psychotic groups, specially in catatonics has been regarded as a sign of negativism by both Williams and Bartlett. On the assumption that hebephrenics and other types of schizophrenics are more like catatonics than are paranoids in their body-sway suggestibility we may expect to obtain a greater backward sway in the nonparanoid group than in the paranoids.

It was predicted by one of the authors that an increase in the monotony of the environment under which the body-sway test is given would result in an increase in the amount of sway, because monotony would increase inhibition (3). So the body-sway test was given under two conditions—once under the usual conditions, and once when a

[1] The authors wish to thank P. E. Slater for statistical advice, W. D. Furneaux for discussing the results of this study and Dr. E. P. H. Charlton of Banstead Hospital who made available the facilities for the study.

The authors are grateful to Professor A. Lewis for his valuable comments.

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metronome was beating at 72 times a minute, the latter being supposed to be monotony producing.

Turning to the second problem, namely the relationship between verbal conditioning and suggestibility, very little is known. The type of verbal conditioning used in this experiment has been described elsewhere in detail by O'Connor and Rawnsley (7), but it consisted of using words as signals and rewards in conditioning simple response behaviour. More details are given below. So far as the capacity to acquire this type of conditioned response is concerned, its relationship with suggestibility is unknown and Berrmann and Hilgard (2) found no relationship between body-sway suggestibility and eyelid conditioning. However, there is not necessarily any relationship between eyelid conditioning and verbal conditioning of the kind used in this experiment. The verbal conditioning design included a measure of the development of an inhibitory response to an already elaborated excitatory stimulus, described below. On the basis of Pavlovian theory it was expected that a measure of inhibitory tendency would have some relationship with suggestibility as measured in the body-sway test.

Method

Apparatus

A simple method of measuring body-sway was used. One end of a string was clipped to the collar of the subject while a weight was attached to the other end. The string passed through three eyelets, two at the two ends and one at the middle of a scale pasted horizontally on the wall. The scale had twenty four half-inch divisions at either side of the middle point. Two moveable washers were also supported by the string at either side of the middle eyelet. Just before the test was given, the two washers were brought together to the middle point and any slight forward or backward sway displaced one or the other washer. E read the maximum forward and backward sways.

Subjects

Twenty paranoid and twenty nonparanoid schizophrenics were used as subjects. They had been previously selected for verbal conditioning experiments and thus had been equalised for age. All of them were male schizophrenics. Mean age was 44.37 S.D. 5.7.

Experimental Design and Procedure

Every subject had been given the verbal conditioning test before he was given the body-sway test. Suggestion in the latter was given by word of mouth and not by recorded voice as is sometimes done.

Subjects were tested for both static ataxia and body-sway suggestion under two conditions—with and without metronome. The metronome was set at 72 beats per minute and at a distance of about ten feet from the subjects. Half of the *Ss* were given the test *first without* the metronome (Order I) and half *with* the metronome *first* (Order II). Static ataxia was measured for one minute after which *Ss* were asked to open their eyes momentarily and then close their eyes for two minutes during which body-sway suggestions were given orally by *E*. A break of approximately one minute was given between the two conditions (with and without metronome). Maximum forward and backward sways were recorded both during static ataxia and body-sway to the nearest half inch. A fall was scored as twelve inches.

A factorial design without replication (4) was adopted to take into account all the variables.

The verbal conditioning experiment consisted of two levels of verbal conditioning—a and b—b being the verbal repeat of a, the word "light" being used as a signal instead of the light itself. Therefore a only is described.

a: *S* sat facing a booth with his fingers resting on a key. In front of him was an aperture in which a red light appeared if *E* pressed a button. The experiment consisted of three procedures succeeding each other in time. In the first section, a red light was presented to *S* and after two seconds *E* said "Press". If *S* pressed, *E* said "good". "Press" was thus the U.C.S., red light the C.S. and pressing the key on the part of *S* was the response. As *S* pressed the key, the light went out; therefore both the act of switching off the light and the word "good" uttered by *E* were extra reinforcements. Conditioning was taken to be established when *S* pressed the key as soon as the red light appeared; that is before *E* said "Press". The criterion of the establishment of conditioning was 10 C.R.s. In the second part of the experiment, *E* said "No don't press" when *S* had responded to the signal. After *S* had given 10 C.R.s—that is, did not press to the red light, the third part was commenced. *E* again said "Press" after the red light signal had been given. Thus, the first section was called 'C', the Conditioning; the second one was called 'Ex', Extinction and the last one 'C_2', the second Conditioning. The score for a section was the number of trials taken to elicit the 10 C.R.s. Thus, the faster the conditioning, the smaller the score.

Results

Means and S.D.s of all the body-sway scores are given in Table I.

An analysis of variance based on forty *Ss* was carried out on the body-sway data. Of the five main effects, the significant ones were;

Table 1
Means & S.D.s of Body-sway Scores

	Without Metronome				With Metronome			
	Static Ataxia		Body Sway		Static Ataxia		Body Sway	
	+	−	+	−	+	−	+	−
Paranoid								
Mean	2.0	1.475	4.325	2.375	2.275	1.475	3.825	2.425
S.D.	2.380	0.680	3.537	1.829	2.332	0.782	3.300	1.591
Nonparanoid								
Mean	1.325	1.075	3.600	1.850	1.425	1.100	2.750	1.725
S.D.	0.507	0.481	2.791	1.666	1.062	0.538	2.657	1.504

The figures are in inches.
+ means forward sway.
− means backward sway.

Table 2
Analysis of Variance of Body-sway Test Scores

Source of Variance	Sum of Sqs.	df	M.S.V.
Total Variance	1498.624	287	
Accounted for by:			
Main Effects	242.774	5	48.555**
(a) Diagnostic Groups	61.883	1	61.883***
(b) Metronome	.008	1	.008
(c) Order	.805	1	.805
(d) Stat. ataxia & body-sway	118.195	1	118.195***
(e) Forward (+) & Backward (−) Sway	61.883	1	61.883***
First Order Interactions	70.289	10	7.029
Second Order Interactions	38.312	10	3.831
Third Order Interactions	8.960	5	1.792
Fourth Order Interactions	.428	1	.428
Residual Variance	1137.861	256	4.44477
Total all Interactions	117.989	26	4.53804

** F significant below .01 level.
*** F significant below .001 level.

diagnostic groups, static ataxia and body-sway, and forward sway and backward sway. These results are presented in Table 2.

Of the first order interactions, only group order interaction was significant. Similarly, only one of the second order interactions—diagnostic group x order x forward backward sway—was statistically significant. None of the third or fourth order interactions were sig-

nificant. Since there was no specific hypothesis enabling us to expect the above two interactions to be significant, we combined the interactions in each order. From Table 2 it is clear that taken collectively none of the interactions reach a statistically significant level. Indeeed, the total of all interactions is not any bigger than the residual. Therefore it was decided not to consider the two significant interactions.

Table 3 gives the product moment correlations between some of the measures of body-sway test. The level of significance reported is that of the corresponding 'Z', (4).

To obtain correlations between static ataxia and body-sway or between forward and backward sway, the scores without metronome were considered; for those will be more similar to body-sway test scores obtained in previous studies. Because the correlations were based on only 20 *Ss*, correlations as high as .39 did not reach statistical significance. In discussing such correlations, therefore, the smallness of the sample has to be remembered.

Differences between some pairs of correlation coefficients with their significance level are given in Table 4. Here again, the differences are those between corresponding Z's.

Table 3

Product-moment Correlations Between Some Measures of Body-sway Test

	Paranoid (N = 20)	Non paranoid (N = 20)
Static ataxia		
Correlations between forward and backward sway	−.378	.036
Correlations between sway with metronome and without metronome (forward sway)	.972***	.602**
Correlations between sway with metronome and without metronome (backward sway)	.704***	.598**
Body-sway		
Correlations between forward and backward sway	.395	.339
Correlations between sway with metronome and without metronome (forward sway)	.951***	.838***
Correlations between sway with metronome and without metronome (backward sway)	.825***	.567**
Correlations between static ataxia and body-sway (forward sway, without metronome)	.536*	.339

Significance levels are shown as follows:

* $p = <.02$

** $p = <.01$

*** $p = <.001$

Table 4
Differences between Correlations

(A)	Paranoid	Non-paranoid	Significance of Difference
Satic ataxia			
Without vs with Metronome (forward sway)	.972	.602	<.001
Without vs with Metronome (backward sway)	.704	.598	N.S.
Body Sway			
Without vs with Metronome (forward sway)	.951	.838	<.01
Without vs with Metronome (backward sway)	.825	.567	<.02

Paranoid

(B)	Forward Sway (+)	Backward Sway (−)	
Stat. ataxia			
Without vs with Metronome	.972	.704	<.001
Body Sway			
Without vs with Metronome	.951	.825	<.01

Nonparanoid

Without vs with Metronome	.838	.567	<.02

Results concerning the relationship between verbal conditioning and suggestibility are as follows:

Phi coefficient and the corresponding chi squares were computed between the scores in verbal conditioning and maximum sway during suggestion. Only the paranoid group was considered, for as will be discussed afterwards, the maximum sway under suggestion for the nonparanoid group was less reliable and clinically their behaviour seemed very different. Only the phi coefficient between 'E_x' (Extinction) and maximum sway (0.552) and that between 'E_x minus C_2' and maximum sway (0.471) were statistically significant (at the 2 percent and the 5 percent level respectively). The direction of relationship was found to be positive, i.e. those who extinguished readily swayed less than those who extinguished with difficulty.

Discussion

From the results of the analysis of variance, it is clear that the introduction of the metronome did not produce any changes in the *Ss* sway. This does not completely rule out the monotony hypothesis because the

metronome seemed to act as a distracting agent. Many *Ss* kept turning their head in its direction in spite of repeated instructions not to do so.

The difference between the diagnostic groups is significant. An inspection of Table 1 reveals that the mean sway of paranoids in *all* conditions is greater than that of the nonparanoids. This finding is in line with previous work (9) as far as the greater forward sway of paranoids is concerned. But as mentioned earlier, the evidence from past studies point to a greater backward sway of nonparanoids. This is not the case in the present study. Both paranoids and nonparanoids sway more forward than backward.

The greater forward sway of the paranoids needs some explanation. Clinically, the paranoids are thought to be more in touch with reality than the nonparanoids. During a test like the body-sway test, following the Experimenter's suggestion is of course important. If the nonparanoids do not follow the suggestion, their sway is liable to be erratic, and for this reason less reliable. Actually this is found to be so in our study. We may regard the correlation between the sway scores with and without metronome as an indicator of the reliability of sway; for the metronome did not have any effect on the sway as seen from the results of the analysis of variance. Comparing the reliabilities of sway for paranoids and nonparanoids (Table 4), it is clear that both for static ataxia and suggested sway the reliabilities are higher for the former group than for the latter.

The reliability of body-sway both during static ataxia and the body-sway test is very high for the paranoid group. Eysenck (5) reports the test retest reliability of suggested sway to be .93. The comparable figure for our paranoid group was .95. Static ataxia is also a very reliable measure (.97 in our study), when retest is carried out shortly after testing. However, the reliabilities mentioned above are for forward sway. Backward sway does not appear to be so reliable. Both in paranoids and in nonparanoids, forward sway is more reliable than backward sway (see Table 4). Neither in static ataxia nor in suggested sway were the correlations between forward and backward sway statistically significant. This may be partly because of the small number of cases ($N = 20$). It appears, however, that forward and backward sway would be negatively correlated in static ataxia and positively correlated in suggested sway.

The relationship between verbal conditioning and maximum sway during body-sway is best seen in the significant phi-coefficient between 'E_x' score and maximum forward sway. Probably the significant phi-coefficient between 'E_x minus C_2' and maximum sway could be accounted for by the correlation between 'E_x' and maximum sway. How can we interpret this relationship? A high 'E_x' score implies a failure to inhibit

a previously acquired response. It may therefore, indicate a weakness of the inhibitory process. The degree of such weakness is roughly reflected in the magnitude of the 'E_x' score. It can be easily argued that a weakness of the inhibitory process will facilitate body-sway suggestibility.

However, further experimental verifications are needed before we accept the above interpretation that both body-sway suggestibility and 'E_x' score are causally related to weakness of the inhibitory process. One way is to deduce the consequences of a weakness of inhibition like easy disinhibition or weak extinction and compare groups for a positive relation between these and suggested sway. Yet another way is to design more complex verbal conditioning experiments to get a subtle measure of the weakness from 'E_x' score. Until such experimental evidence is forthcoming, our explanation will remain tentative.

Summary

Twenty paranoid and twenty nonparanoid schizophrenics were tested for body-sway suggestibility and verbal conditioning. Paranoids showed greater sway than nonparanoids and both groups swayed more forward than backward. Forward sway was found to be a more reliable measure than backward sway. Both static ataxia and suggested sway were found to be highly reliable over short test-retest periods. The smaller sway of the nonparanoids was explained in terms of difficulty of communication. With regard to the verbal conditioning, it was found that the difficulty of inhibiting an already acquired conditioned response was positively related to the amount of sway produced by suggestion. This was tentatively interpreted as due to the degree of weakness of the capacity to inhibit responses.

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HYPNOSIS IN ANESTHESIOLOGY

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The role of hypnosis in anesthesiology is a relatively new one. For a better appreciation of its status a specific definition is necessary. The two fields are closely interrelated,—all doctors practicing anesthesia, also practice a form of hypnosis, either consciously or unconsciously. Furthermore, I feel that in the future this relationship will become even more interdependent. Therefore a basic knowledge of hypnosis—when and where to apply it, how far to carry it and when to recognize whether or not it has lost its effectiveness, is important training for the present day anesthesiologist. The following is a brief resumé of some of the developmental aspects of the growth of anesthesiology to the present time, when we now are beginning to utilize the hypnotherapeutic method in our practice.

The practice of anesthesiology as we recognize it today is a totally different field of endeavor than existed a little more than a decade ago. The second World War gave tremendous impetus to a fledgling and mostly unrecognized area of patient care. Prior to this stimulus, anesthesiology was essentially a cause and effect type of medical practice. The patient was given a drug and if sufficient unconsciousness resulted so that the surgical procedure could be accomplished, then the anesthetic process was judged to be sucessful.

The progress of anesthesiology has kept apace with the progress of medicine. As a knowledge of pharmacology and physiology grew, as a recognition of the nature of disease processes and their effect on the human mechanism developed—so did a concrete form of patient care within the speciality of anesthesia develop. The anesthesiologist became involved with, and responsible for, the care of the patient for that period of his illness which had as its centered focus, the surgical procedure. This has come to encompass and perhaps transgress upon, depending upon ones view point, several other specialties in medical practice. We have become respiratory physiologists, how else could we appreciate the various physiologic alterations in respiratory function which the patient has suffered and which might well radically alter our approach in the administration of anesthesia? We have become part-time cardiologists—otherwise how could we appreciate the vagaries of

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the wandering pacemaker and counteract circulatory abnormalities that are not infrequent occurrences during anesthesia. I could go on and on and relate how easily it is to become involved in fluid balance, blood volume studies, in CNS pathology, endocrinology and myriad other physio-pathological states that would perhaps have a major exacerbation during or immediately post anesthetically.

As we conceived better and more modalities for caring for patients we sought newer and greener fields into which we would extend and perhaps the last outpost, the one area that relatively few workers in the field have delved into, in this new concept of anesthesiology, mind you, is the psychic approach, this is the field of emotional stress, that limbo of the patient that holds so much and about which we know so little. There is little understanding relative to pain perception and pain reaction. We know the pathways to the upper reaches of the CNS, but what results after that is not very definable. Why do some patients evidence no pain following major surgery and some become practically moribund after a relatively minor procedure? What determines pain threshold? The definitive answer is yet to be discovered.

As a result of advances in chemoanesthesia and with the continued search for better anesthesiologic care it then became rational for the practitioner to move into this land of the unknown, via suggestion or hypnosis. Perhaps with this modality we can add to the ultimate welfare of those patients under our care. This, then is a very brief description of the road the anesthesiologist has travelled to the relatively present time.

But why hypnosis? It has been stated that hypnosis is an integral part of psychotherapy. Are anesthesiologists capable of practicing psychotherapy? This is best answered by stating, that, without so labelling our approach, we have been practicing psychotherapy all along. In the modern practice of anesthesia, we feel that the development of a rapport with the patient is of utmost importance. This is established usually by preoperative visits to the patient, the day or two before surgery, or by preoperative evaluation clinics as are established in some hospitals. Along with determining the patient's physical status, we try to estimate their emotional approach to their impending surgery and anesthesia. The bravest of patients is afraid to be anesthetized, for this state is close to death in the minds of everyone. However, by discussing the technic, by giving reassurance to both the patient and the family, by answering their various questions, by explaining the steps to be taken before they are "asleep" and what will happen when they awaken, we hope to establish a more tranquil state. It has long been taught that a patients who understands and

trusts the physician who will care for him while in an unconscious state will receive such service with less psychologic trauma than might otherwise ensue. This approach is not completely altruistic on our part, for the patient who arrives in the operating room in a calm, relaxed state is much easier to anesthetize than one who arrives excited, nervous and distraught. Furthermore, we know that by alleviating their fears and apprehensions and promising a smooth, quiet induction of anesthesia with no possibility of feeling pain or "seeing anything" we may often lessen the amount of drugs that may otherwise be necessary to administer.

This preoperative visit is important with all patients. But, nowhere is it as important as when we deal with children. One only has to witness, on a single occasion, the animal-like terror of a child being held and slowly induced with anesthesia to imagine how this memory will live with him forever. By getting to know the child, by becoming his friend, by talking to him about his toys or school and thus calming him preoperatively with kind words this entire ordeal can frequently be avoided.

This approach, we cannot and do not label hypnosis, for we do not attempt to induce a true trance. We do hope, however, through reassurance, to alleviate some of the tension which preoperative patients have. It is only a short step then from this approach to the achievement of the truly interpersonal relationship that hypnosis has as its foundation. But should all anesthesiologists practice hypnosis? Should there be perhaps some specific psychiatric orientation for the anesthesiologist before he enters into the aforementioned interpersonal relationship with his patient? This problem most often develops its own solution, not all anesthesiologists are desirous of developing the necessary emotional tie that hypnosis implies. Those that are and do, soon find that they had best know and understand what they are getting into after this relationship is developed. Also, as more and better educational facilities become available for those seeking such knowledge, so will more anesthesiologists who desire to add the practice of hypnosis to their armamentarium, become better equipped to do so.

For those of us who so wish then, hypnosis is a very desirable adjunct to the practice of anesthesiology. Now I would like to relate, how, in our daily routine, we may integrate the hypnotherapeutic technic.

The patients cared for by anesthesiologists are practically all referred. The contacts are perforce limited ones. We see the patient once, possibly twice prior to surgery. Therefore, the opportunities to develop a great deal of rapport are not present. However, if we desire

to spend a little time and find the patient suitable it is often quite effective to attempt a superficial trance induction and then either directly, or via PHS* produce a relatively tranquil emotional state for the prospective ordeal. By the way, in our preoperative use of the hypnotic technique, we do not use the word hypnosis unless it is brought into the conversation by the patient. Perhaps one day, when hypnosis is recognized as a completely medical approach, we can forego this temporarily justifiable subterfuge.

As an example of the use of hypnosis preoperatively, we had one particular patient who refused to have a nasogastric tube inserted, stating that the presence of the tube caused her to be continuously nauseated and to induce regurgitation. The so-called nausea that so many people are prone to develop, is I feel, often a fear reaction. After several sessions of hypnosis this patient was convinced that the presence of the tube was beneficial to her condition, would not cause nausea, and therefore would be able to be tolerated. Subsequently, she successfully underwent a total gastrectomy, with a gastric tube in place for eight days and not once complained of its presence. Another patient, a physician himself, refused to sign the operative permit because he had learned that an endotracheal tube was to be inserted. Even though he was assured that this would be done after he was anesthetized, he refused to permit it. The contemplated surgery was a thoracotomy and an endotracheal tube was mandatory. Via hypnosis, he uncritically accepted the need for the endotracheal tube as a necessary element in his anesthetic care and subsequently was most grateful for the psychologic maneuver which allowed him to come to surgery in so relaxed a mood.

If the patient is sufficiently suggestible, we have by hypnosis, indicated a relatively carefree and comfortable preoperative state and by so doing we often have diminished the quantity of antimetabolic drugs which are a necessary component of the usual anesthetic routine.

We can recite numerous other instances of the truly useful purposes hypnosis has in the preoperative phase. But rather, I would emphasize that if the anesthesiologist is so oriented, he needs only the proper circumstances and patients to create his own opportunities.

As for the operative phase, though some anesthesiologists attempt and succeed in producing anesthesia for an entire surgical procedure by hypnosis, we feel that the incidence of suitable patients and the time element involved is too uncertain to adopt this as a routine procedure. Perhaps more importantly, our concept is that hypnosis

* Post Hypnotic Suggestion.

is not a replacement for surgical anesthesia but rather it is an adjunct, another tool in the kit. It is a method or technic, which when properly used in the right situation will enhance chemoanesthesia.

We have on occasion, wherein we have produced chemoanesthesia by means of a regional technic, such as spinal or nerve block, also induced a light hypnotic trance. Once this is accomplished, we have kept the patient in this state for the duration of the operation and added a PHS* to ensure postoperative comfort.

In a recent issue of the British Medical Journal, there is a report of a patient who required a skin graft which would necessitate fixation of his forearm to his leg for a period of six weeks. He was hypnotized for the surgical procedure and via PHS* was able to maintain this abnormal positioning for the required period of time without any other type of immobilization.

We have also induced hypnotic states in patients for sundry minor procedures, such as cystoscopies, removal of packing and simple fracture reduction.

For those patients in whom we do wish to produce true anesthesia for surgery I find that a period of conditioning is necessary, that the patient must be properly receptive and that perhaps most important, it is too time consuming for routine use. This opinion is borne out by the experience of other qualified workers in the field.

We are called on occasionally to treat various postoperative surgical complications. Hiccough is not an infrequent occurrence following intraabdominal surgery and anesthesia. If one can rule out any true organic pathology which is etiologic, then these patients are amenable to hypnotherapeusis for the condition. Also, many times patients immobilize themselves postoperatively, either because of pain, fear of pain, fear of disrupting their wounds or just plain fear. In these days of early ambulation, with its proven benefits, these patients are not lending themselves to the accepted postoperative therapy. We have hypnotized some of these people and suggested to them that activity is beneficial and will accelerate their healing processes. With this as a motivating force many very rapidly adhere to the desirable stirup regime, are out of bed and cooperating extremely well.

We have been on occasion, presented with the problem of postoperative oliguria and requested to utilize hypnosis in the condition. However, as opposed to enuresis, the postoperative oliguria has as its basis most often an organic pathology which requires more than suggestive therapy.

I want to stress that in treating all of the aforementioned conditions,

we have always centered our approach around the natural desire of the patient to get well. This I feel is most important. If one utilizes hypnosis in this fashion, and gives the patient a reason for the uncritical acceptance of suggestion and a rational approach to the end result, then I feel that two purposes are specifically served. One, the desired objective will more certainly be attained; secondly, the therapist, i.e., the anesthesiologist, is remaining within the field, in which he is best oriented.

Hypnosis is a truly useful tool in pediatric anesthesiology. In some institutions anesthesia care for children has become a subspecialty of the entire field. However in our general anesthetic practice we also often see many children who are coming to surgery. I have already mentioned the psychic trauma that is inflicted upon the child who enters a world of foreign faces, noises, lights and other adventitious stimuli without proper orientation and preparation. I'm sure that many individuals can well recall having had their tonsils out and how even now in adult life that experience remains in memory as one of real horror. Many avenues of psychic sedation have been and are being used for these frightened children. Among them are rectal medication, space masks that have gases flowing into them, repeated and constant reassurance. However, with the advent of the hypnotherapeutic technic perhaps there is a better approach. We have been able to produce complete amnesia in children prior to tonsillectomy. We are planning a physical set-up so that we may be able to produce group hypnosis as a means of preanesthetic induction. Children who are at the age of 7 or 8 are good subjects for hypnotherapy. One can produce an anesthetic state in a child relatively easily and so accomplish such procedures as fracture reductions, needle punctures or wound dressings. The technic we use is that of visual imagery. We ask the child to imagine he sees his favorite TV program or is looking at a picture of his mother or any such familiar pattern and then, with repetitive suggestions pertaining to the particular subject, we can usually produce rather readily, a hypnotic trance.

An illustration of this was the case of an 8 year old child who was to be operated upon for a congenital cardiac malformation. She was seen several times preoperatively and each time an increasing depth of trance was evidenced. She was given a PHS* for amnesia for the entire operative episode and also for any discomfort postoperatively. No attempt was made to induce hypnoanesthesia for the operative procedure per se. It was felt that the interests of all concerned would best be served by having the patient unconscious throughout the surgery. Postoperatively, the child did not require any sedation for

the relief of pain and had no memory of the entire episode. As an interesting sidelight, on a postoperative visit to the child, as we entered the room, she was being asked by the nurse whether she had any pain in the operative site. The child began to say she did but when she caught sight of us, she immediately replied that she felt no pain at all. In general, the experience with children, if we are judicious in our approach, is usually quite gratifying.

The practice of hypnotherapy in obstetrical procedures is well documented and well recognized by both the medical profession and the laity. Perhaps is should be stated that most of this variety of practice is done by the obstetricians themselves. We have found its use worthwhile in the small percentage of cases we have had occasion to treat. The presently accepted figures are that approximately 20% of obstetrical patients are sufficiently suggestable to allow for the production of an adequate level of hypnosis to serve as a definite aid during labor and delivery. Of these 10% are suitable to permit for the use of hypnosis alone for the period of labor and delivery.

Before going into a few of the details of the technics suitable to these patients I should mention that one of the principal drawbacks to its use, from the anesthesiologists viewpoint, is the time required. One of my colleagues became involved with a case wherein he induced hypnosis on a Friday morning in a primipara well established in labor. Finally, on Sunday evening he was able to leave the obstetrical suite. The obstetrician meanwhile, had had his golf game and theater party. This may be an extreme situation, but one must be willing and able to devote great quantities of time to this type of endeavor.

Many physicians, particularly the obstetricians, condition their parturients for hypnotherapy in groups. The patients are seen at bimonthly intervals in groups of as many as are available. The novices are quickly impressed by these already conditioned and they are all taught self induction technics. Most physicians make an attempt to explain and to correlate the labor and delivery period with the hypnotic phenomena. The patients are taught to produce anesthesia of various parts of the body and to maintain this type of altered sensitivity for the duration of their labor and delivery. Some will add chemoanesthetic agents to supplement, some feel that if the hypnotic state is not sufficient for the entire procedure that they have failed and will revert entirely to chemoanesthesia. For those who desire to condition their patients individually, this technic entails even greater time consumption and those who do this try to correlate it with the prenatal visits. We in anesthesia, who practice hypnosis in obstetrical cases, see our patients usually bimonthly, occasionally weekly, and

start about the 5–6 month of pregnancy. The patient who *seeks* the modality of hypnosis for the delivery of her baby is usually a good patient. The one who thinks "she might like to try it" is usually not the one in whom it will be successful.

It is possible to produce complete anesthesia for the entire procedure. We do not try to produce amnesia. This would be destroying, to some degree, one of the major purposes of the technic. The ability to experience the labor and delivery procedure on the proper emotional plane, without the distortion which is produced by the usual physical discomforts is an important aspect of the parturients experience.

Recently, a young lady, whom I had been preparing for the past 3 months for her anticipated labor and delivery, came to the hospital and delivered. She was a particularly good subject. She had sought the use of hypnosis for her pregnancy. During her preparation she had learned self-induction technics. I had naturally expected to be with her during the delivery. However, unfortunately she went into premature labor and I was neither alerted nor available. In any event, the patient came to the hospital with what she described as mild discomfort. Within a half-hour of arrival the obstetrician examined her and found that she was ready to deliver. I arrived an hour later to discover, that although she had experienced no real pain, she had progressed so imminently to the point of delivery that the obstetrician became concerned and uncertain and despite her self induced pain free state, had given her a saddle block and delivered her. She had no postpartum pains and went home in 3 days. I was most distressed to have missed the climax of about 12 hours of preparation, but no one can deny the success of the hypnotic procedure.

One other field and a fruitful one I believe, for hypnotherapy, is in the field of pain relief, that is where pain is the presenting symptom. These pain syndromes have various etiologic backgrounds, some organic and some functional. I feel that we can treat the symptom complex without bringing to the surface the developmental aspects of the patients pain. Some therapists have stated that if we make an attempt to relieve the pain we should substitute some other emotional crutch. I do not agree with this concept and think that it is not necessary to even try to remove the pain per se. Instead I try to produce a state of acceptance of pain and perhaps a realignment of the patients activities with the painful state placed on a so-called "tolerable basis". A case illustrating this was the patient sent to us who had had an abdominal aortic occlusion with subsequent by-pass and graft operation. He did well, had an excellent surgical result, but three months later developed severe leg and foot pain. This could not be explained on an

organic basis from the physical findings. Without attempting to discover any other precipitating factors he was hypnotized and conditioned to accept the painful state as the most minor sequela of his operative procedure and to return to his previous activities.

Other painful states such as causalgia and some types of tic doloreaux, have responded well to hypnotherapy. We are now in the process of treating a patient with Hodgkin's disease with nerve root involvement. If this presenting complaint remains constant, the outcome may well be favorable.

The therapy of pain in terminal cancer states has recently been publicized. Our experience has indicated that in a worthwhile percentage of cases it will prove to be time and effort well spent.

I have not entered into a discussion of the hazards of the hypnotherapeutic technic. I'm sure that any conscientous, informed practitioner realizes that many of his patients are living a day to day existence on a compensated emotional basis. Should one attempt to disturb that compensation by some form of emotional detective work in order to treat a symptom complex, he had better be prepared to treat the untoward sequelae as well, namely the potential aberrant reactions to his probings.

This discussion has centered about the utilization of hypnosis within the practice of anesthesiology. I stress within, because I do not feel that we who are primarily trained in anesthesiology can or are prepared to indulge in hypnotherapy on any other scale. Consistent with this view point is, I feel, the attitude that hypnosis is not in any sense a substitute for chemoanesthesia but rather an adjunct, an aid. This must always be kept in mind.

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HYPNOTIC EXPERIMENTS ON THE PSYCHOSOMATIC ASPECTS OF GASTROINTESTINAL DISORDERS

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We have performed the following experimental studies in order to give scientific and objective evidence to psychosomatic concepts in gastrointestinal disorders.

Methods

In order to study the influence of emotions upon gastrointestinal function, interview techniques and hypnosis were used. Prior to experiments various psychological conditions or problems, which were tied up with past experiences and seemed to induce different emotions in each of our healthy subjects or psychosomatic cases, were studied by interviews and psychological tests. Then definite emotional reactions could be induced in our subjects by discussing those emotionally charged conditions or problems under hypnosis or in the waking state.

Results

1. The influence of emotions induced by hypnotic suggestions upon gastric secretion.

Thirty-eight healthy boys and girls (age 16–18) were selected for the experimental measurement of gastric juice under hypnosis.

The influence of hypnosis alone upon gastric secretion was studied on 50 occasions. Very slight increase in gastric secretion was observed in 10 and very slight decrease in 9. However, in the greater part (31), no change was observed. Thus we found that the influence of hypnosis alone upon gastric secretion is not significant.

In 34 out of 36 subjects free acid, total acidity and quantity of gastric juice increased by the suggestion of taking "a delicious meal". The suggestion of "sadness" decreased gastric secretion in seven out of eight subjects. Hypnotic suggestions of "fear", "resentment" and "gastric

Table 1

The changes in gastric juice by hypnotic suggestions

Suggestion / Reaction	Delicious meal	Sadness	Fear	Resentment	Gastric disturbance
Increase	34	1	2	7	3
Decrease	2	7	19	13	14
No change	0	0	1	0	1
Total	36	8	22	20	18

disturbance" inhibited gastric secretion in the majority of our subjects. (Table 1.)

The reason why the same kind of suggestion induces two different patterns of psycho-physiological reactions in our subjects will be discussed in the next chapter.

2. The influence of emotions induced by hypnotic suggestions upon gastric motility.

Twenty healthy high school boys and girls (age 16–18) were selected for the experimental study of gastric motility under hypnosis.

The hypnotic suggestion of "dangerous situation" inhibited or stopped gastric movement in nine and accelerated it in eleven subjects. This same kind of suggestion seems to cause two different reactions. One is a "withdrawal reaction", in which subjects are overwhelmed by fear and become helpless, and this seems to cause the inhibition of gastric movement. The other is an "anxiety reaction", in which subjects are frightened but still are able to fight against fear (struggling state) and this seems to cause the acceleration of gastric movement.

The suggestion of "resentment" increased gastric movement in four and inhibited it in two subjects. This same suggestion also causes two different reactions. One is "aggressive" and the other is a "depressive" reaction. Aggressive reaction seems to cause the acceleration and depressive reaction seems to cause the inhibition of gastric movement.

The suggestion of "joyful excitement" accelerated peristalsis and increased gastric tone in all six subjects.

The suggestion of "sadness" inhibited peristalsis in six and accelerated it in two subjects. These two subjects became rather excited and cried instead of becoming depressed. This seemed to cause the acceleration of gastric movement.

The suggestion of a "delicious and preferable food" accelerated gastric peristalsis and increased gastric tone in both of two subjects. The suggestion of "a distasteful food" inhibited peristalsis and decreased

gastric tone in two and revealed the reverse effect in one subject. The last subject seemed to become resentful of this condition.

3. The influence of emotions induced by hypnotic suggestions upon colonic motility.

Thirty-three healthy high school boys and girls were selected for the experimental observation of colonic motility under hypnosis. In 22 of these subjects more or less significant changes in colonic motility were observed in kymographic tracing from sigmoid colon following suggestions of "a delicious food", "resentment", "sadness", "fear" and "joy".

Case Report

Case 1. 47-year-old widow
Chief Complaint: cramping pain in epigastrium.
Personality: emotionally unstable and hysterical.

This symptom seemed to be precipitated by emotional conflict with her lover. The hypnotic suggestion of this problem made her resentful and cry. In the meantime she started complaining of epigastrial pain under hypnosis. At this time abnormally strong contractions of her stomach were observed by x-ray.

Case 2. 39-year-old housewife
Chief complaint: pain in lower abdomen and constipation.

Her symptoms of spastic colon seemed to be precipitated by emotional problem with her husband. Marked spasm of her ascending, transverse and sigmoid colon was induced by hypnotic suggestion of this problem during fluoroscopic examination. This was further confirmed by kymographic tracing from her sigmoid colon.

Case 3. 35-year-old male
Chief Complaint: Alternating constipation and diarrhea and pain in lower abdomen.
Personality: passive-aggressive and nervous

His symptoms of irritable colon seemed to be precipitated by emotional problem with his mother. With the patient in the waking state marked spasm of his transverse colon was induced by discussing this emotionally charged subject during fluoroscopic examination. This was again confirmed by kymographic tracing.

Such experiments were repeated in the same patients two or three times with the same psycho-physiological reaction. The induced emotion in these experiments was mostly "resentment". Thus it is felt that

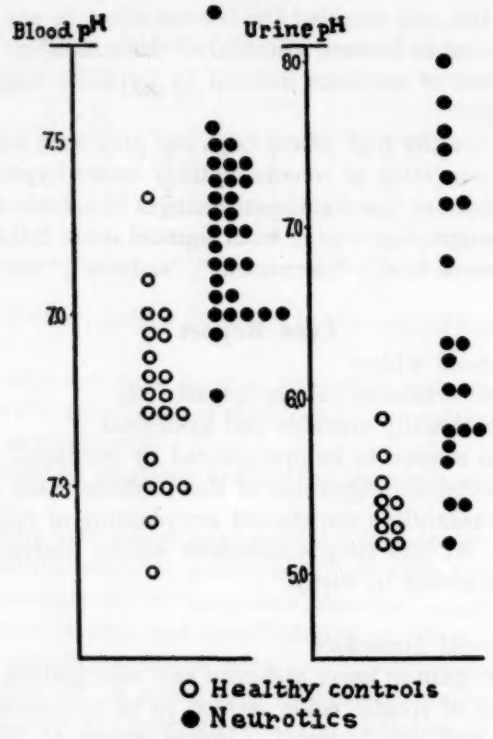


FIG. 1. Comparison of blood pH and urine pH in neurotics with those in healthy controls.

definite relationship between a certain symptom and a certain emotional problem can be proven by this kind of technique.

4. The influence of hyperventilation induced by emotional stress upon gastrointestinal function.

It was found that blood pH and urine pH in patients of psychoneurosis are inclined to be slightly more alkaline than those in healthy subjects (Fig. 1.) and that urine pH in patients of psychoneurosis is more changable and alkaline under stress during daytime than that in healthy subjects. (Fig. 2.)

Blood pH of healthy subjects moved to alkaline side by hypnotic suggestion of fear, while it slightly moved to acid side under hypnosis without suggestion. (Fig. 3.) Table 2 shows the change in CO_2 and O_2 tension in arterial blood of healthy subjects by hypnotic suggestion of fear. By measuring bicarbonate in blood it was confirmed that such change in blood pH under emotional stress is induced mainly through

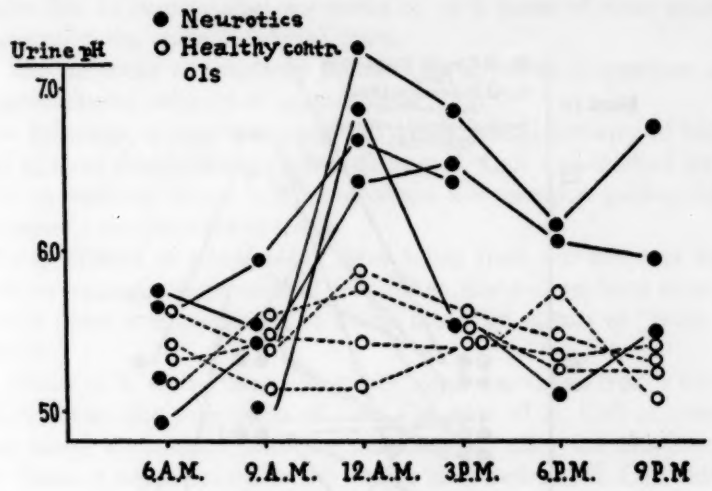


FIG. 2. Diurnal change in urine pH in neurotics

Table 2

Changes in CO_2 tension and O_2 tension in arterial blood of healthy subjects following the suggestion of fear under hypnosis

Name	Age	Sex	CO_2 tension in art. blood		O_2 tension in art. blood		Respiratory rate	
			Before suggestion	During suggestion	Before suggestion	During suggestion	Before suggestion	During suggestion
			mmHg	*mmHg*	*mmHg*	*mmHg*		
T.Z.	15	m.	41.6	17.5	81.5	87.9	18	22
T.K.	16	m.	43.1	21.2	86.2	95.4	21	26
S.Y.	17	f.	43.8	23.2	79.3	104.8	22	26
C.O.	15	f.	43.5	19.4	77.9	104.8	18	24
H.N.	15	f.	46.0	29.5	76.5	101.8	21	24
			43.6	22.2	80.3	98.9	20	24.5

the respiratory mechanism (respiratory alkalosis due to emotional hyperventilation).

It was found by our animal experiment that hyperventilation (respiratory alkalosis) accelerates gastrointestinal motility and tone. The increase in gastric tone in Fig. 4 was induced by forced overbreathing. Thus hypermotility of gastrointestinal tract induced by abnormal res-

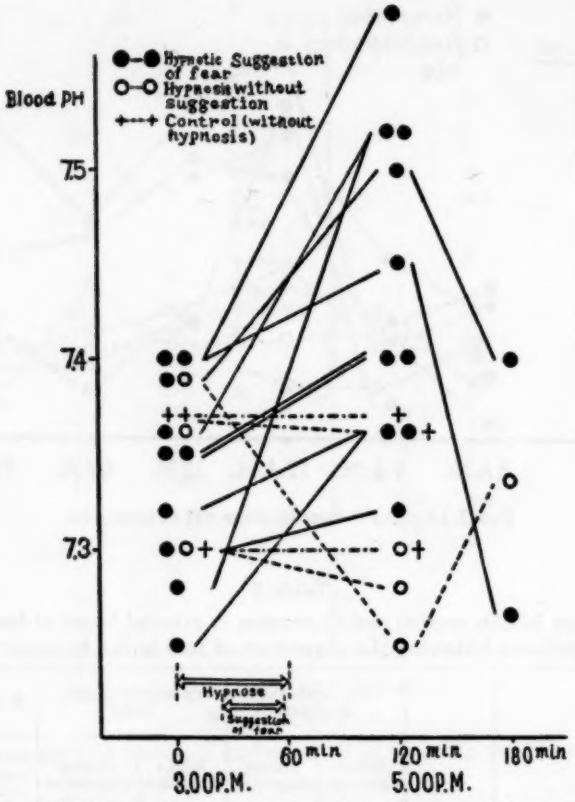


FIG. 3. Influence of hypnotic suggestion of fear upon blood pH

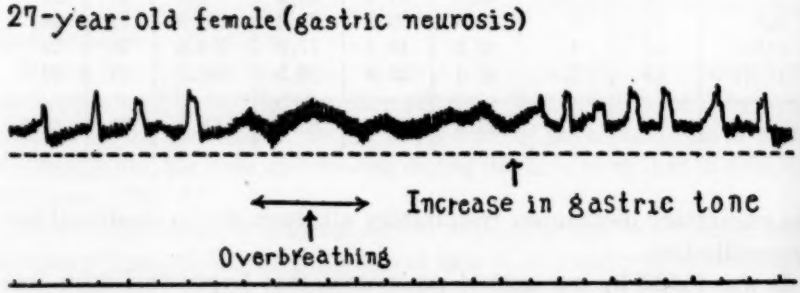


FIG. 4. Increase in gastric tone following the forced overbreathing

piration due to emotional stress seems to be a cause of some neurotic symptoms in the gastrointestinal tract.

5. The influence of emotions induced by hypnotic suggestion upon the antibacterial activity of human blood.

The influence of emotions upon the antibacterial activity of human blood against Staphylococcus Aureus and E. Coli was studied by the following method. These micro-organisms are common pathogens for infections in the digestive system.

The specimens of whole blood were taken from our subjects before and after hypnotic suggestion of fear. Then micro-organisms were cultured in these two specimens of whole blood by means of "Slide Cell Culture".

A colony of E. Coli cultured in whole blood was taken from a healthy subject before the suggestion of fear. Colonies of E. Coli cultured in whole blood were taken from the same subject after the suggestion of fear. There is a marked difference in size of colonies of E. Coli between these two specimens.

The Comparison of the diameter of Colonies of E. Coli cultured in whole blood taken before the suggestion of fear with that of E. Coli cultured in whole blood taken after the suggestion is shown in Table 3.

Table 3

Comparison of the diameter of colonies of E. Coli cultured in whole blood taken before the suggestion of fear with that of E. Coli cultured in whole blood taken after the suggestion

No.	Age	Sex	Before sug.	After sug.	Difference
1	16	m	14.05	9.47	−4.58
2	15	m	13.5	13.7	+0.2
3	16	m	17.91	10.69	−7.22
4	16	m	29.06	13.31	−15.75
5	17	m	13.71	12.34	−1.37
6	17	m	35.2	29.6	−5.6
7	17	m	24.39	14.69	−9.7
8	17	m	21.71	16.52	−5.19
9	16	m	18.29	15.95	−2.34
10	16	m	21.11	19.77	−1.34
11	17	m	18.14	13.9	−5.24
12	17	m	12.56	8.44	−4.12
13	16	f	21.98	21.0	−0.98
14	17	f	19.93	12.82	−7.11
15	17	f	21.59	12.94	−8.65
mean			20.21	16.01	−4.2

Table 4

Comparison of the diameter of colonies of staphylococcus aureus cultured in whole blood taken before the suggestion of fear with that of staphylococcus aureus cultured in whole blood taken after the suggestion

Healthy subjects						Neurotics					
No.	Age	Sex	Before sug.	After sug.	Difference	No.	Age	Sex	Before sug.	After sug.	Difference
			μ	μ	μ				μ	μ	μ
1	17	m	22.6	18.5	4.1	1	21	m	18.7	10.3	8.4
2	16	m	23.5	18.2	5.3	2	26	m	19.6	12.8	6.8
3	17	m	21.7	15.9	5.8	3	35	m	12.8	6.7	6.1
4	17	m	22.4	17.6	4.8	4	46	m	8.51	5.01	3.5
5	16	m	22.9	20.3	2.6	5	52	m	18.8	12.5	6.3
6	16	m	25.4	24.2	1.2	6	47	f	19.7	11.6	8.1
7	15	m	25.1	23.6	1.5	7	18	f	20.1	13.4	6.7
8	15	m	26.2	25.3	0.9	8	16	f	18.2	12.3	5.9
9	15	m	21.7	19.4	2.3	9	23	f	19.3	9.9	9.4
10	16	m	25.8	24.4	1.4	10	18	f	19.4	10.7	8.7
			23.7	20.7	2.9				17.5	10.5	7.0

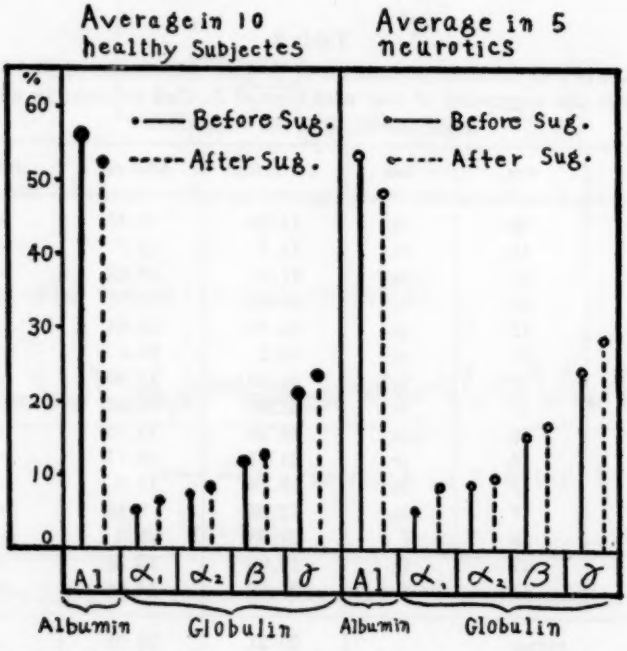


FIG. 5. Changes in fractions of serum protein following hypnotic suggestion of "fear"

The significant decrease in size of colonies of E. Coli after hypnotic suggestion of fear can be seen in this table.

The same tendency was found in Staphylococcus Aureus. The comparison of the diameter of colonies of staphylococcus cultured in whole blood taken from healthy and neurotic subjects before the suggestion of fear with that of staphylococcus cultured in whole blood taken from the same subjects after the suggestion is shown in Table 4. The difference in size of colonies is more marked in patients of psychoneurosis than in healthy subjects.

In order to find the cause of such an increase in antibacterial activity of human blood after hypnotic suggestion, the following experiments were performed.

Fig. 5. shows fractions of serum protein in blood specimens taken before and after hypnotic suggestion of fear. As shown in this Figure, albumin decreased and globulin increased after the suggestion of fear.

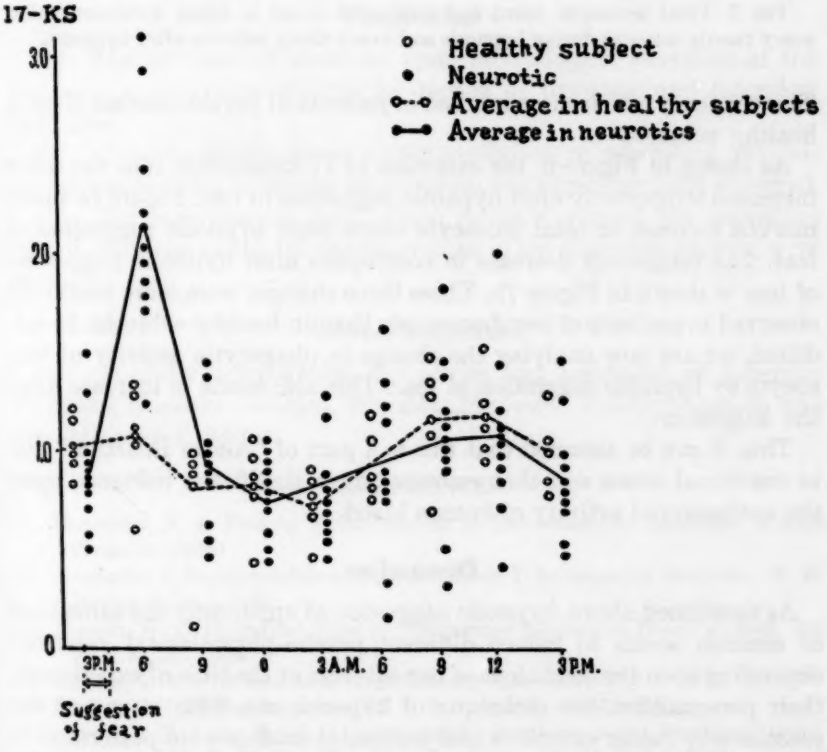
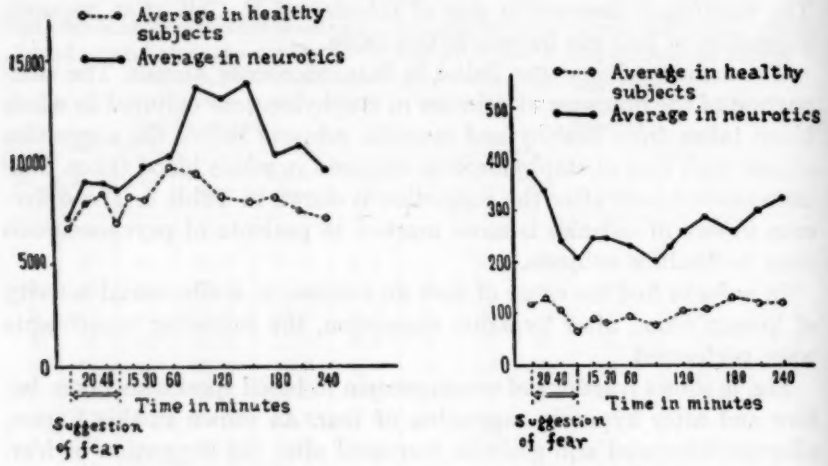


Fig. 6. The amount of 17-Ketosteroid excreted into urine specimens taken every three hours.



a. Total leucocyte count b. Eosinophils

FIG. 7. Total leucocyte count and eosinophil count in blood specimens taken every twenty minutes during hypnosis and every thirty minutes after hypnosis.

This tendency also is more marked in patients of psychoneurosis than in healthy subjects.

As shown in Figure 6, the excretion of 17-ketosteroid into the urine increased temporarily after hypnotic suggestion of fear. Figure 7a shows marked increase in total leucocyte count after hypnotic suggestion of fear. The temporary decrease in eosinophils after hypnotic suggestion of fear is shown in Figure 7b. These three changes were more markedly observed in patients of psychoneurosis than in healthy subjects. In addition, we are now studying the change in phagocytic activity of leucocyte by hypnotic suggestion of fear. This also seems to increase after the suggestion.

Thus it can be assumed that this is a part of "Alarm Reaction" due to emotional stress and that emotions have significant influence upon the antibacterial activity of human blood.

Discussion

As mentioned above, hypnotic suggestion of apparently the same kind of emotion seems to induce different psycho-physiological reactions depending upon the conditions of our subjects at the time of experiment, their personalities, the technique of hypnosis etc. This is one of the reasons why rather extensive and statistical studies were performed in this report. The direction of physiological reaction to a certain emotion, which has been observed in the greater part of our subjects (ex-

periments), can be considered to be the major physiological reaction to this emotion.

However, it is very difficult to find a certain direction of physiological reaction to a special kind of emotion (joy, resentment, sadness, fear etc.). More fundamental classification of emotions other than such a simple one as joy, resentment, sadness, fear etc. seems to be necessary for us to find a definite relationship between psychological conditions and the direction of physiological reactions. Further studies should be done on this respect.

One conclusion, which can be drawn at present, is that emotions, no matter what kinds of emotions they may be, have definite influence upon the physiological functions of the digestive system. In addition, it seems to be important to mention the fact that the relationship between a certain emotional problem and a certain symptom in psychosomatic cases can often be proven by the above-mentioned objective techniques.

Conclusion

(1). The influence of emotions upon physiological functions of the digestive system were studied by means of hypnosis and interview technique.

(2). The role of emotional hyperventilation in producing psychoneurotic symptoms in the digestive system was experimentally observed.

(3). The experimental data, which strongly suggest the important role of emotions in the infectious process in the digestive system, were presented.

Acknowledgement

We gratefully acknowledge the advice and assistance of Emeritus Professor Naosuke Onodera, Emeritus Professor Toichiro Sawada and Mr. Michael J. Millet.

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SOCIAL AND ENVIRONMENTAL PERCEPTIONS OF SUSCEPTIBLE AND UNSUSCEPTIBLE HYPNOTIC SUBJECTS

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The purpose of this study was to test the hypothesis that hypnotic susceptibility is significantly related to the way in which the hypnotic subject (*S*) perceives or characterizes fundamental aspects of his social and environmental milieu and, further, to consider the relationships of these perceptions to the nature of the hypnotic state.

To test the hypothesis, the experimenters (*E*s) have compared the susceptible with the unsusceptible on the basis of how they perceived or characterized the following areas: (a) their parents; (b) personal worries and problems; (c) social activities and interests as group or individually oriented; (d) participation in social activities in school; (e) physical care. Because of the better adjustment associated with susceptibility (Faw and Wilcox, 1958), we predicted that the susceptible would perceive their social and environmental milieu in more positive terms than the unsusceptible.

Questions which arose during the course of the investigation concern the following: (a) what conceptual framework in the field of general psychology would explain hypnotic phenomena according to our operational definition of hypnosis? (b) how perception of the social and environmental milieu (areas) relates to our theoretical explanation of hypnosis.

Method

Data concerning the *S*s, induction of hypnosis and assessment of susceptibility have been utilized from a previous study (Faw and Wilcox, 1958) and are summarized here.

Subjects

The *S*s were 44 women and 36 men, all first year college students who were taking a beginning course in general psychology. None had previously been hypnotized; all were willing *S*s and none dropped out.

Induction

A mass induction technique was developed which was of a half hours duration. The *Ss* were divided into three sections for ease in administering the hypnotic suggestions which were read.

Assessment of susceptibility

New for this study was the use of rating scales modified after Ruch and Warren's (1953) "An intensive personal data record." For the rating of parents, 26 scales, such as the one illustrated below, were employed:

Just : : : : : : : Unjust

1 2 3 4 5 6 7

Instructions to the *Ss* were of this nature: "Characterize your father by placing a check mark at any point on the scale which characterizes how you really felt about him." On the remainder of the inventory, "Yes" or "No" answers were to be indicated by a check mark. This personality inventory was part of a testing battery taken several months prior to and independently of the hypnotic induction.

Statistical Test of Significant Differences

The responses on the inventory were analyzed by the chi square test to determine the level of the statistical significance between the susceptible and the unsusceptible. Positive differences indicate that the susceptible more frequently checked the side of the scale which is oriented toward a positive perception of the social and environmental milieu.

Results

When the chi square differences in Table 1 were considered, four things were noted. The first is that 17 of the 26 scales had comparisons which reached statistical significance and these are the ones recorded. The second is that differences between the susceptible and the unsusceptible as a group were not consistent when differences were calculated seperately for male and female. The third was that of the 145 comparisons which were explored, 129 were positive, 11 were negative, zero, or not enough cases were available for chi square determinations. 38 of the 39 comparisons to reach statistical significance were positive. The fourth was that an overall sign test of statistical significance indicated a strong probability that the susceptible perceived their parents more positively than the unsusceptible.

The classification of comparisons on scales which reached statistical

Table 1

Chi Square Differences Between Susceptible and Unsusceptible Subjects on Ratings of Parents

Scale	Male & Female		Male		Female	
	Father	Mother	Father	Mother	Father	Mother
1. Just-unjust	5.22*	3.21*	4.13*	5.04*	3.95*	.35
2. Fair-unfair	9.71**	3.08*	4.12*	1.80	2.89*	1.11
3. Mild-severe	−.22	−.81	2.42	−.22	−3.34*	−.50
4. Loving-rejecting	3.13*	3.15*	2.46	2.24	1.88	.59
5. Friendly-hostile	1.89	3.70*	1.50	3.65*	.57	1.08
6. Kind to spouse-mean to spouse	4.30*	1.95	3.74*	.78	.36	.94
7. Kind to brother-mean to brother	10.78**	6.08**	—	—	—	—
8. Kind to sister-mean to sister	5.68**	4.47*	.34	4.63*	—	—
9. Loves spouse-hates spouse	3.87*	.23	.83	.20	—	—
10. Parents married-parents divorced or separated	6.77**	6.87**				
11. Parents strong-parents weak	6.87**	7.68**	.05	12.85**	7.08**	9.40**
12. Industrious-lazy	2.56	3.29*	1.02	8.61**	1.68	.18
13. Calm-emotional	3.17*	.78	1.36	.03	2.20	1.13
14. Clever-dull	1.82	.83	1.55	3.87*	.79	.23
15. Lots of fun-grim	1.90	4.96*	.94	7.56**	.78	.23
16. Attends church-does not attend church	7.37**	5.01*	.55	.77	6.33**	4.08*
17. Subject is active in church-not active						
Male	6.8**					
Female	13.60**					

* Significant at .05 point
** Significant at .01 point

significance pertained to evaluative, affectional and supportive relationships. Comparisons which did not reach significance had reference to educational, economic and intellectual characteristics of the parents.

Father and mother were rated by the susceptible as more just, fair, loving, friendly, kind to brother and to sister, strong, fun, and as more frequent church attenders than the unsusceptible. Parents of the susceptible were more apt to be married rather than divorced or separated. The only negative rating to reach statistical significance was that of the susceptible female who more frequently perceived the father as severe in discipline.

Twice as many comparisons reached statistical significance for the parent of the same sex as for the parent of the opposite sex. One of the

Table 2

Chi Square Difference Between Susceptible and Unsusceptible Hypnotic Subjects on Personal Worries and Problems as Self Rated

	Male & Female	Male	Female
Not concerned about adjustment to opposite sex	3.94*	.56	3.42*
Not worried about personal appearance	4.14*	2.46	1.23
Not worried about personal habits	0.00	.36	−.37
Not worried about what others think of you	1.24	.48	.25
Not worried about grades in school	.26	—	−.10

* Significant at .05 point

greatest differences between the susceptible and the unsusceptible was that the susceptible were more active in church.

Table 2 indicated that the susceptible, as a group, perceived themselves as significantly less concerned about adjustment to the opposite sex and not as worried about personal appearance as the unsusceptible. When male and female were considered separately the only comparison to reach statistical significance was that of the susceptible female who rated herself as not as concerned about adjustment to the opposite sex as that of the unsusceptible female.

Table 3 indicated that the susceptible as a group perceived themselves as more group oriented in regard to leisure time, principal hobbies and amusements than did the unsusceptible.

In table 4 the following differences reached statistical significance: the susceptible females more frequently rated themselves as having worked in high school and as more active in extra-curricular activities than did the unsusceptible females.

Table 3

Chi Square Difference Between Social Activities and Interests Rated as Group Oriented or Individually Oriented

	Male & Female	Male	Female
Work or play which subject enjoys	.75	.82	.30
If subject had time and money what kind of activities would he engage in?	.70	.98	.03
If subject had two full hours of leisure each day what would he do?	6.48**	—	2.10
Chief hobbies and amusements	4.31*	1.47	1.49

* Significant at .05 point
** Significant at .01 point

Table 4

Chi Square Difference Between Participation in Social Activities in School

	Male & Female	Male	Female
Subject worked while in high school	1.82	.39	2.73*
Number of extracurricular activities in high school	1.12	2.13	.49
Number of extracurricular activities in college	1.79	−1.13	5.37*
Offices or positions held in high school	2.10	2.77*	.18
Number of groups and organizations belong to	.20	.08	−.72

* Significant at .05 point

Table 5

Chi Square Difference Between Susceptible and Unsusceptible Hypnotic Subjects on Self Rating of Physical Care

	Male & Female	Male	Female
No present physical ailments (checklist of)	.39	.09	.21
Good present physical health (rating of)	.69	1.50	−.24
No serious illness of members of family	.86	2.03	.03
Ratio between height in inches and weight in pounds	1.29	0.00	2.19
Have not been hospitalized	0.00	4.09*	−2.72*
Subject breast fed or bottle fed	.05	.03	−.10
Good health as child	.50	.02	.98

* Significant at .05 point

Table 5 indicated a statistically significant difference in regard to one scale only; susceptible males rated themselves as less frequently hospitalized than did the unsusceptible males. Quite the opposite was revealed to be true of the susceptible female *Ss*; they were more frequently hospitalized than were the unsusceptible females.

Discussion

The *Es* interpret the results of the present study as supporting the hypothesis that the susceptible perceive their social and environmental milieu differently than do the unsusceptible and in more positive terms. Our previous study (Faw and Wilcox, 1958) employing the same *Ss* as in this study indicated that the susceptible had personality characteristics which inclined them to perceive their environment in terms of being more optimistic, more pleasantly expectant, more relaxed, more secure, better satisfied with their own sex status and less disturbed by bizarre thoughts and depression than did the unsusceptible.

The *E*s hypothesize that the perception of the social and environmental milieu constitutes a consistent pattern, loosely held, capable of expansion and inclusion, integration and differentiation. The perception of the milieu is structured by fundamental life experiences in terms of the perception of the parents, personal worries and problems, social activities and interests.

Suggestions arouse expectancies, anticipations or personal hypotheses which become a gauge to test the efficacy of these suggestions. If the hypnotic challenge is responded to affirmatively, the suggestions are taken as reality and the *S* is to that degree, hypnotized. Additional suggestions would lead to deep hypnotic involvement. If, on the other hand, the *S*'s response to the suggestions are adverse and his expectancies, anticipations, etc. are not realized, the *S* remains unaffected and is not hypnotized and further suggestion would not produce the hypnotic state. The *E*s conclude that the *S* was hypnotized when he realized, actualized, maintained and affirmed hypnotic suggestions in the form of perceptual experiences activated by the stimulus situation as interpreted by the *S* and formulated by the hypnotist.

The *E*s' approach to hypnotic phenomena demands an isomorphic relationship between the perception and the structurization of the social and environmental milieu. The *S*s were relatively normal, none showed signs of stress or strain. The social and environmental milieu was that of a rather benign college atmosphere. The suggestions were those which most normal *S*s could easily follow without fear, hesitation or doubts. Under these conditions, the *S*s who perceived their environment in more positive terms were more susceptible than those who perceived their environment in negative terms.

Under other conditions, susceptibility may and sometimes does bear a different relationship to perceptualization. For instance, *S* with severe pain, might be more easily hypnotized than persons who are not ill if the anticipation was that hypnosis would relieve pain (Crasilneck, 1958).

The *E*s have employed the term "perception" in its broadest sense. According to the directive state theorists Bruner (1958) and Postman (1951, p. 249), perception involves not only the stimulation of the sense organs but it is also molded by personality characteristics, and especially those affectional and contextual conditions relating to the social and environmental milieu.

The conceptualization of the data in relation to susceptibility follows: the way in which the susceptible perceived their parents, as measured by the scales, was found to be directly related to susceptibility. The perceptual pattern of the parents, in terms of evaluative

and affectional relationships was of a positive nature. It would follow, then, that the social and environmental milieu, including the personality of the hypnotist, would be organized upon a similar basis and that the susceptible *Ss* would incline to accept the suggestions in a pattern of affirmative perceptions.

Church attendance was more strongly associated with susceptibility than was any other variable. Parental church attendance was of special significance to susceptible female hypnotic *Ss*. The significance of church attendance, is variously interpreted. First, it may represent security, family solidarity and better adjustment. Second, according to Bowers and Glasner (1958), there is a close relationship between hypnosis and religious phonomena. Church and hypnotic procedures have much in common such as fixation of attention, rhythmic movements, reliance upon an outside source of power to lessen tension, eye-closure and soft-spoken soothing words. Still another interpretation may be that persons who attend church may have been susceptible to the suggestions of their parents; non-church attenders may have rebelled against the suggestions of their parents.

Both male and female susceptible hypnotic *Ss* tended to be less concerned about adjustment to the opposite sex and less worried about personal appearance than were the unsusceptible but these variables appeared to be of more importance to the female. The conclusion is that security concerning adjustment to the opposite sex and freedom from worries about personal appearance helped the *Ss* perceive themselves as able to carry out the hypnotic suggestions in a friendly and cooperative atmosphere. Then, too, the social contagion of suggestions was more effective amongst those who were not concerned about personal problems. The same reasoning held true for other perceptions of the susceptible: the susceptible male and female were more group oriented and had participated in more social activities than had the unsusceptible.

Ratings of physical care indicated a strong sex difference in relation to susceptibility. Susceptible males tended not to have been hospitalized whereas the susceptible female *Ss* tended to have been hospitalized. It is suggested that hospitalization for the susceptible male *Ss* was associated with disability, loss of personal integrity, with weakness and inability to retain employment. Hospitalization, to the susceptible female *Ss*, may have represented security and care as in the case of child-bearing. The conception of hospitalization may be the basis for different perceptions of the social and environmental milieu which, in turn, is related to susceptibility.

Summary

1. The purpose of this study was to test the hypothesis that hypnotic susceptibility was positively related to the perception of fundamental aspects of the social and environmental milieu and, further, to consider the nature of hypnosis itself.

2. *Ss* for this study, 44 women and 36 men, were employed from a previous study (Faw and Wilcox, 1958). A mass hypnotic technique was used and susceptibility was operationally defined by the use of rating scales. The susceptible were found to have better personality adjustment than the unsusceptible.

3. New for this study were self-rating scales of the *Ss'* perception of parents, personal worries and problems, social activities as group or individually oriented, social activities in school, and physical care. The rating scales were administered several months prior to and independently of the hypnotic induction.

4. Interpretation of results support the hypothesis that the susceptible perceived their social and environmental milieu in more positive terms than did the unsusceptible. The susceptible perceived their parents in significantly stronger affectional and supportive relationships than did the unsusceptible. The susceptible were less concerned about adjustment to the opposite sex, not as worried about personal appearance, were more group oriented and more likely to engage in social activities than were the unsusceptible. Susceptible males were less frequently hospitalized than were unsusceptible males while susceptible females were more frequently hospitalized than were unsusceptible females.

5. Hypnosis was defined as a tendency to accept suggestions and to actualize, maintain and affirm them in the form of perceptual experiences activated by the stimulus situation as interpreted by the *S* and formulated by the hypnotist. The suggestions arouse expectancies or personal hypotheses which become a gauge to test the efficacy of the suggestions. Perceptualization is shaped by motives and past stimulation of the social and environmental milieu.

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A SYSTEMATIC APPROACH TO INDUCING HYPNOTIC BEHAVIOR

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The purpose of this paper is to describe a technique of obtaining hypnotic behavior based on the methods ordinarily used in inducing, conditioning and extinguishing operant behavior, and to present the results obtained by the use of the technique. Skinner's (1938) concept of operant behavior refers to behavior emitted by the organism that has no immediately apparent and/or readily definable stimulus referrent. The ingredients of that human behavior ordinarily designated as "hypnotic" can be thought of as analogous to operant behavior as conceived by Skinner. It seems gratuitous to state that behaviors displayed by hypnotic subjects are in the repertoire of the human organism, yet the point needs to be made. Take, for instance, amnesia for experience during the hypnotic trance. It is one of the commonly accepted indices of deep hypnosis. Ask any teacher if he thinks that amnesia for recent events is in the repertoire of the student! We do not wish to belabor the point but merely assert that if we consider hypnotic behavior as operant behavior then we are in a position to approach systematically the induction of such behavior. The present study demonstrates that this systematic approach leads to increased efficiency in inducing hypnotic behavior.

Method

Before presenting the specifics of the procedure for inducing hypnotic behavior it would be well to go over, briefly, the principles employed. First, an attempt is made to induce "hypnotic-like" behavior by beginning with the Kohnstamm phenomenon. Success with it is followed by the body-sway test and relaxation. The reader will note that S is taught behavior that is more and more like hypnotic behavior, in a sense, "crowding the threshold" (Guthrie, 1935). He will also note that S's cues are narrowed to the operator by cutting down as much as possible all other stimuli such as extraneous sounds, light, movement, etc. This sort of procedure has recently been given the name "shaping" by Skinner (1958). In this case it consists of shaping S's responses so that

[1] The authors are indebted to Dr. W. O. Jenkins for a careful reading of the manuscript and constructive criticisms arising therefrom.

they become more and more like the end response desired, cued to a particular stimulus, in this instance, the operator.

Reinforcement is used throughout the procedure. It consists of sounds and words of approval made by the operator, and satisfaction of expectancies built into S by the operator. Thus, with the Kohnstamm phenomenon, the hand *does* rise; during the body sway the body *does* sway; after inhaling maximumly the muscles of the diaphragm *do* relax. Responses of the subject are cued to the voice of the operator on a 100 per cent reinforcement schedule.[2] The reader will note, as shown later at the end of the procedure, maximal cue change helps change the subject's behavior, from hypnotic to normal waking.

The specifics of the procedure employed consists of the following steps.

1. This step involves establishing rapport and allaying any fears S may have about hypnosis. E rewards acceptance on S's part.

2. The next item has to do with an explanation that hypnosis is an ability which can be learned and that the two most important tasks of S are be able to relax and to listen. E rewards acceptance, again.

3. There follows a demonstration of the Kohnstamm phenomenon by the operator and instructions to S to do it. This procedure is also used to illustrate that the operator does not want resistance or cooperation but merely relaxation and concentration. E rewards S for "letting it happen".

4. Body sway. Here S is required to tilt his head back and close his eyes with the operator standing in back of him saying, "you're falling backward". This procedure is continued until S falls backward. He is rewarded for "letting it happen".

5. In this phase, S lies on a couch with eyes closed and hands at sides. E darkens the room to minimize all cues except the voice of the operator. Begin, here, with low and consistently pitched voice by E.

6. Here, S is taught to relax by breathing deeply in accordance with the operator's instructions while on the couch. The operator gives suggestions of tension when the breath is held and relaxation when it is released. This method of inducing relaxation is described in detail elsewhere (Pascal, 1947, 1949).

7. The suggestions are given of feelings of relaxation flowing from tips of toes progressively to the top of the head, relaxing muscles, making blood circulate easily, organs function smoothly and breathing gently and effortlessly.

[2] It seems perfectly feasible to consider the use of partial reinforcement in this procedure to build a more stable habit, although it has not as yet been attempted systematically.

8. S is asked to nod if he feels relaxed. Reinforcement is given for this behavior with "good" or "fine", as before.

9. Suggestion is given for loss of pain and loss of heaviness in the left arm from the elbow down, then suggestion of numbness and lightness, and, finally, suggestion of arm lifting off the couch into the air. Sounds of approval are given by E.

10. In this step S is told to stop his arm in the air and a test for anesthesia is made with a sharp pin making a visible scratch on the hand. S is asked if he feels pain. Reinforce loss of pain with "good".

11. Suggestion is continued for raising of arm with concurrent suggestion for increasing drowsiness followed by suggestion for deep sleep when fingers touch face. Continue reinforcement as aforementioned. Suggestion is given of normal sensation flowing back into the left arm.

12. S is given a suggestion to sit up, open his eyes and turn around, remaining in the trance. He is asked to draw a picture recalled from grammar school, and write a number afterward. Continue reinforcement.

13. Suggest to S amnesia for drawing and give simple post-hypnotic suggestion of replying with the number when the operator asks, "What's the number?" after S is awakened. S is also instructed that he will not remember writing down the number and will not remember the operator telling it to him.

14. Have S lie down again remaining in a deep sleep. Give post-hypnotic suggestion that in the waking state, when the operator lights a cigarette, S will feel pebbles in his shoe and will take off his shoe, shake out the pebbles and put his shoe back on. Suggestion is also given that S will not remember the operator giving this suggestion. Ask for understanding of instructions and reinforce as before.

15. Tell S that the operator will count to ten to awaken him. S is instructed that he will be completely alert, refreshed and awake and will feel as if he's had a comfortable sleep. Count slowly to ten, turning on lights just before the last number is reached. Increase loudness of voice as the counting proceeds. This procedure allows for maximal cue change from the hypnotic to the waking state.

16. Ask S how he feels. Ask if he felt as if he had been asleep. Say, "What's the number?" Ask where S got the number. Show S the drawing and ask if S remembers the drawing and number. Light a cigarette and test for post-hypnotic suggestion.

Subjects

All Ss were taken from the first year general psychology course at the University of Tennessee. They volunteered for the experiment knowing

they would serve as hypnotic Ss. They were given points in the course for volunteering but it was indicated to them at the beginning that they would receive the points regardless of whether they were "good" Ss or not. It should be mentioned that almost the entire class was willing to participate and over half the class was used in the experiment. They ranged in age from 17 to 29 years of age with the median age being 19. Seventeen females and 39 males participated in the study. Each S was seen only once.

Results

The entire procedure never took more than 45 minutes and took as short a time as 20 minutes. The procedure from the Kohnstamm phenomenon took from five to 25 minutes with the average about 20 minutes. If a person failed to satisfy the early steps the procedure was discontinued at that point. Only seven out of the 56 subjects failed to go through the entire procedure. Of these seven, two failed to complete the Khonstamm phenomenon successfully, three more failed the body-sway, and an additional two failed the hand levitation test. All were discarded at the point of failure. The rest of the 49 subjects went through the whole procedure. In calculating our percentage of successes, however, we included the entire N of 56.

Table 1 shows our results. Our most important finding is, that of the 56 subjects 52 per cent were able to achieve a somnabulistic trance. This figure is to be compared with previous figures reported in the literature which indicate that only 20 per cent of experimental populations are able to reach this deep hypnotic trance (Bernheim, 1947). The table also shows that 48 Ss or 86 per cent achieved glove anesthesia. This figure is to be compared with the 50 per cent usually reported (Bernheim, 1947). An interesting finding is that of the 49 people suc-

Table 1

Percentage of subjects Satisfying the Criteria Set for the Various Steps in the Hypnotic Procedure (N = 56)

		Kohnstamm Phenomenon	Body Sway	Hand Levitation	Glove Anesthesia	Post-Hypnotic Amnesia	Post-Hypnotic Suggestion
All Ss Satisfying Criteria	N	54	51	49	48	37	29
	%	96	91	88	86	66	52
Male Ss Satisfying Criteria	N	38	36	34	33	25	18
	%	97	92	87	85	64	46
Female Ss Satisfying Criteria	N	16	15	15	15	12	11
	%	94	88	88	88	71	65

cessfully completing hand levitation only one failed to achieve glove anesthesia. If we go back to the body sway test we can see that of the 51 who successfully completed that test 48 or 94 per cent were able to experience loss of pain. This finding accords with that of Eysenck & Furneaux (1945) and others (Dittborn, 1956; White, 1930) on the predictive power of the body sway test for a medium trance. The table also shows that women tend to be slightly more susceptible to deep hypnosis than men (Bernheim, 1947; Hull, 1933). Only 46 per cent of men achieved the deepest trance, while 65 per cent of women were able to carry out post-hypnotic suggestions, but this difference is not statistically significant.

It was observed that all Ss who showed post-hypnotic suggestion also exhibited post-hypnotic amnesia. This result is consistent with findings in the past that amnesia is necessary for post-hypnotic suggestion to be effective (Erickson and Erickson, 1941). The reverse was not true however. Eight people who achieved post-hypnotic amnesia did not carry out the post-hypnotic suggestion. This result is also consistent with past findings. Ability to carry out a fairly unusual post-hypnotic suggestion is considered a deeper state of hypnosis than amnesia (Davis and Husband, 1931). Twenty people satisfied all the criteria through hand levitation and glove anesthesia perfectly and failed to show any post-hypnotic amnesia or to carry out the post-hypnotic suggestion. Those people, however, who went into the deepest stages always satisfied the earlier criteria very easily. If we consider only the 49 Ss who were subjected to the entire procedure a Guttman Scale (1941) emerges. Every S who passed a later test also passed all the previous tests. There were no reversals.

Discussion

It seems safe to say that the results obtained far exceeded the expectancies of the authors. Although the senior author has had considerable success in inducing hypnotic behavior over the past several years using the systematic approach presented in this paper, there always remained the doubt that the success might be due to behavior particular to the operator rather than the procedure employed. Therefore, in order to exclude this factor, all of the subjects of the present experiment were hypnotized by the junior author after relatively little training. To check on the possibility that experience of the junior author might have something to do with success in achieving the deep trance, the sample was divided in two, based on the order hypnotized. There was no difference between the number of subjects achieving post-hypnotic suggestion in the first and second half of the experiment. Considerable experience in

teaching this systematic approach to hypnosis to graduate students lends credence to this finding. Once the systematic approach is grasped and the procedure learned, the experience of the operator in inducing hypnotic behavior seems to make little difference in the successes obtained when *using this particular procedure*. The important determiner of success seems to be the successive, specific steps in the sequence which emerge from the systematic approach.

There have been a number of attempts at theory construction in hypnosis. None of these, however, has led to increased efficiency of hypnotic induction, nor have they brought hypnotic behavior into the realm of scientific psychology as it stems from the work of the experimental laboratory.

The human organism contains in its repretoire the ingredients of hypnotic behavior. These ingredients can be "shaped" into hypnotic behavior as measured by accepted tests. Hypnotic behavior as displayed in the deep trance state is acquired behavior and, as such, can be learned by anyone desirous of learning it. Of course, it is true that those Ss who are most at ease and comfortable with the operator in the preliminary talk learn most easily, but that would be most likely true with any learning experiment. The point we wish to make is that this experiment is essentially one in learning. Any hypothesizing about hypnotic behavior must take into account the principles known to be related to *learned* behavior. By systematically applying known principles of learning to inducing hypnotic behavior we have been able to demonstrate more than twice the accepted efficiency of usual hypnotic procedures.

Summary

The paper reports an experiment in inducing hypnotic behavior. Hypnotic behavior is considered as operant behavior subject to the principles of such behavior. Using a procedure based on this systematic position 52 per cent of 56 subjects were brought to the deep trance state in one session, a considerable gain over results reported in the literature. It is felt that the approach presented suggests that hypnosis may be brought into the realm of behavioral science.

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May 12, 1959

Erratum

In the October, 1958 issue of the *Journal*, the article "Expectation as a Factor of Sleep" by Dr. Julio M. Dittborn of the University of Chile, contained several printing errors and omissions which should be clarified.

A table depicting statistical treatment of results and referred to on page 167 was omitted in publication. Reference number 2 in the bibliography should have listed Dr. Dittborn as the senior author of the article.

In view of these errors, Dr. Dittborn will integrate and republish his data and conclusions in another forthcoming paper.

Table–To Dr. Dittborn's paper*

Subjects		1		2		3		4		5		6		7		8	
		i	s	i	s	i	s	i	s	i	s	i	s	i	s	i	s
Neutral word "alo"	oral	0	−	0	−	0	−	0	−	0	+	0	+	0	−	0	+
	visual	0	−	0	−	0	−	0	−	0	+	0	+	0	−	0	−
Word "dormir" without previous order	oral	0	+	0	−	0	−	0	+	0	−	0	+	0	−	0	+
	visual	0	−	0	−	0	−	0	+	0	+	0	+	0	−	0	+
Word "dormir" plus previous order	oral	0	+			0	−	9	+	35	+	57	+	0	+	9	+
	visual	0	+	0	+	0	+	40	+	8	+	7	+	0	+	2	+
				0	+												
Body sway test		2		4		3		1		1		4		3		2	

i: number of non successive interruptions; s: signs of sleepiness

* October, 1958 issue of this Journal

Introductory Lectures in Medical Hypnosis

from the October 1957 Workshop of the Society for Clinical and Experimental Hypnosis given by the Institute for Research in Hypnosis at Long Island University

edited by Margaretta K. Bowers, M.D.

with an introduction by Milton V. Kline, Ed.D.

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New York The Institute for Research in Hypnosis 1958
33 East 65th St., New York 21, N. Y.
Price: $2.50

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Editor: Dr. S. J. Van Pelt

Editorial Offices—4 Victoria Terrace, Hove 3, Sussex, England

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The British Journal of Medical Hypnotism is the official organ of the British Society of Medical Hypnotists and was first published in 1949. Members of the Society in Great Britain are all fully qualified medical men and members of the British Medical Association.

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